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Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH, AND DEVELOPMENT

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WORLDWIDE REPORT

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

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COUNCIL URGES EXPANSION OF SATELLITE SERVICES

OW111330 Tokyo KYODO in English 1117 GMT 11 Mar 87

[Text] Tokyo, March 11 KYODO -- An advisory council to the director general of Ministry of Posts and Telecommunications' Communications Policy Bureau submitted a report Wednesday recommending international expansion of services by Japan's space communications industry.

The report proposed that Japanese satellite communications firms build an extensive telecom system which can be used for both domestic and international services linking Japan and neighboring Asian countries such as China, South Korea, the Philippines, Hong Kong and Singapore. The report was drafted by the Space Communications Policy Council headed by former Foreign Minister Saburo Okita.

The report said that, if Japanese space telecom firms, which are currently preparing to launch commercial communications satellites, continue to offer services to only domestic clients, their telecom business may become unprofitable due to emerging competition.

The two Tokyo-based space telecom firms are Space Communications Corp. (SCC), a joint venture of Mitsubishi Corp. and Ford Aerospace Satellite, and Japan Communications Satellite Co. (JCS), a joint venture by C. Itoh and Co. and Hughes Communications Inc.

The report stressed that the planned entry of foreign private satellite communications firms like Pan American Satellite Corp. (Panamsat) of the United States will lead to intensive competition in the international space telecom market. Panamsat is very likely to obtain a license from the U.S. Government to provide international space telecom services linking the U.S. and Peru, the report said.

At present, international space telecom market is shared by Intelsat, or International Telecommunications Satellite Organization, and Inmarsat, or International Maritime Satellite Organization. Eleven Intelsat satellites in synchronous orbit provide a global communications service.

The report said that developing a communications satellite with devices enabling both domestic and international telecom use would be more economical and rational than launching two satellites separately for the two purposes. Two communications satellites currently under construction by Ford Aerospace and Hughes Communications are equipped with transponders and spot-beam antennas which are designed to send beams only to the Japanese archipelago.

A senior official of JSC said, "We wish to participate in the international space telecom field in the appropriate future time." The JCS an SCC at present have licenses for providing services only domestically.

/12858
CSO: 5560/062

FOREIGN FIRMS NOT EXCLUDED FROM TELECOMMUNICATIONS PROJECT

Posts Minister Assures Baldrige

OW261421 Tokyo KYODO in English 1349 GMT 26 Mar 87

[Text] Tokyo, 26 March (KYODO)--Shunjiro Karasawa, minister for posts and telecommunications, Thursday assured United States Commerce Secretary Malcolm Baldrige in a letter that Japan had no intention of illegally limiting foreign equity participation in a new Japanese international telecommunications company.

Karasawa's assurance was contained in a reply to Baldrige's March 13 letter expressing fears that the Japanese Government would limit foreign participation in the new enterprise, which will end the overseas telecommunications monopoly currently enjoyed by the government-controlled Kokusai Denshin Denwa Co. (KDD).

Karasawa informed Baldrige that although Japan considered inappropriate the major participation of a foreign telecommunications firm in the management of a rival to KDD, he saw no barrier to the participation of certain U.S. firms in the new telecommunications carrier.

Two rival consortia are competing for Japanese Government permission to launch a new international telephone enterprise.

One consortium, International Digital Communications, Inc. (IDC), includes the British telecommunications firm Cable and Wireless PLC and the Japanese trading company C. Itoh and Co.

The other, International Telecom Japan Inc. (ITJ), is composed of several major Japanese companies including Mitsubishi Corp. and Mitsui and Co.

The Japanese Ministry of Posts and Telecommunications, insisting the international telecommunications market is too small to support more than one rival to KDD, has instructed the contending groups to work out a merger agreement. The two consortia have thus far been unable to reach any such agreement.

The ministry has further pointed out that no country can allow a foreign company a major share in the management of an international telecommunications enterprise. However, the British and U.S. Governments have criticized the ministry's attempt to curtail the degree of foreign participation.

U.S. Secretary of State George Shultz and Trade Representative Clayton Yeutter have both sent letters to Karasawa demanding he allow foreign firms a greater share in the proposed enterprises.

UK Management Share Discussed

OW311245 Tokyo KYODO in English 1226 GMT 31 Mar 87

[Text] Tokyo, March 31 KYODO -- Posts and Telecommunications Minister Shunjiro Karasawa indicated Tuesday that the government will take a flexible attitude toward a request by Cable and Wireless PLC (C and W) of Britain for a strong voice in the management of a planned Japanese firm for international telecommunications.

He told newsmen he understood that ongoing moves among the private quarters concerned for unification of the two Japanese firms planning to enter the market were moving in the direction of allowing the same capital contributions by foreign firms as of the main Japanese investors.

C and W has a stake in International Digital Communications Planning Inc. (IDC), recently established to join in Japan's international telecommunications market, which is presently monopolized by Kokusai Denshin Denwa Co. (KDD).

IDC is a joint venture of major Japanese firms, including C. Itoh and Co. and Toyota Motor Corp., as well as three foreign companies -- Pacific Telesis International Inc. and Merrill Lynch and Co. of the United States, besides C and W.

The other firm also seeking a share in the international telecommunications market is International Telecom Japan Inc. (ITJ), led by Mitsubishi Corp. and Mitsui and Co.

Moves are under way to unify the two firms in keeping with the position of the Posts and Telecommunications Ministry that Japan's international telecommunications market is too small to admit two new firms.

Karasawa talked to newsmen after reporting to prime minister Yasuhiro Nakasone on the moves by the private quarters concerned and their international repercussions.

British Prime Minister Margaret Thatcher reportedly said in a recent Parliament session that Britain will take retaliatory steps unless C and W is allowed a major share in Japan's international telecommunications market.

Karasawa told the prime minister that foreign investment will be welcome within the framework of the telecommunications industry law that limits foreign capital participation to less than 30 percent, government officials said.

He expressed optimism that an amicable settlement will be reached since private mediation moves are making headway on related matters, including foreign firms' equity shares and participation in management, they said. However, he was quoted as stressing his ministry's stand that only one new firm should be allowed.

In this context, the officials said, Karasawa noted that when British Telecom (BT) was privatized four years ago, it was decided to allow only one new entry until 1990, although Britain has an international telecommunications market more than twice the size of the Japanese market.

The prime minister gave no particular instructions, they said.

Only 1 KDD Rival Allowed

OW010715 Tokyo KYODO in English 0634 GMT 1 Apr 87

[Text] Tokyo, April 1 KYODO -- Posts and telecommunications Minister Shunjiro Karasawa Wednesday repeated the government's decision that the size of the Japanese communications market warrants the entrance of no more than one new telecommunications company to challenge the monopoly currently held by Kokusai Denshin Denwa Co. (KDD).

Speaking at a government conference on the controversial "second KDD" issue, Karasawa said he hoped the two rival consortia competing for government permission to enter the Japanese telecommunications market will soon arrive at a merger agreement.

Japan has received harsh criticism from within both houses of the U.S. Congress and threats of retaliatory action from the British Parliament for alleged attempts to prevent foreign firms from holding a significant share in the new telecommunications firm.

One consortium bidding for the right to challenge KDD is International Digital Communications Inc., whose members include British firm Cable and Wireless PLC. (C and W), and Pacific Telesis International Inc. and Merrill Lynch and Co. of the United States.

The other hopeful KDD rival, International Telecom Japan Inc. (ITJ), is composed entirely of Japanese companies, including Mitshubishi Corp. and Mitsui and Co.

Representatives of the two consortia have been engaged in protracted negotiations mediated by the Federation of Economic Organizations (Keidanren), but have failed so far to reach a merger agreement.

Karasawa has indicated to U.S. Government leaders that Japan has no intention of preventing the participation of foreign firms in a "second KDD," but said no country can allow a foreign company to control a major share of the management in such an immense domestic telecommunications enterprise.

Although numerous foreign enterprises have shown interest in joining a new Japanese telecommunications company, Japanese law limits total foreign participation in such enterprises to 30 percent.

/12858
CSO: 5560/067

IMPORTS HELP IMPROVE TELEPHONE FACILITIES

OW121927 Beijing XINHUA in English 1608 GMT 12 Mar 87

[Text] Beijing, 12 Mar (XINHUA)--China has imported large numbers of program-controlled exchange switchboards with a combined capacity of 1.4 million lines, a Chinese official said here today.

An official from the Ministry of Posts and Telecommunications said that this is part of the central government's effort to improve telecommunications.

The program-controlled facilities were imported from Belgium, France, Federal Germany, Japan and Sweden in the past few years, he added.

China has also imported telex and digital microwave equipment, and optical fiber systems and cables, as well as other advanced facilities to improve conditions for foreign investment.

The official said program-controlled exchange switchboards with a combined capacity of 850,000 lines are expected to go into operation in China's large and medium-sized cities this year. Program-controlled exchange switchboards with a combined capacity of 300,000 lines went into operation last year.

The Ministry of Posts and Telecommunications has also used loans from the overseas economic fund of Japan to import program-controlled exchange switchboards with a combined capacity of 150,000 lines last year.

This year, it plans to import program-controlled exchange switchboards governing 600,000 lines this year with Japanese loans.

Similar negotiations are under way between Chinese firms and foreign companies in Britain, Italy and other countries.

/9604
CSO: 5500/4151

NATIONAL RADIO, TELEVISION CORPORATION FOUNDED

OW171140 Beijing XINHUA in English 1116 GMT 17 Mar 87

[Text] Beijing, 17 Mar (XINHUA)—A national radio and television corporation, combining research, development, manufacturing, marketing, maintenance and trade, was founded here today.

The China Communication and Broadcasting Electronics Corporation, affiliated with China's Ministry of Electronics Industry, is aimed at raising the technological level and production capacity of China's radio and TV industry to better serve the national economy and the society.

China's radio and TV industry now boasts 300,000 employees working in 500 research institutes, production units and technical service companies. The industry is now capable of manufacturing communication and navigation equipment, broadcasting and television transmitters, telephone switchboards, microwave communication systems, satellites, telex facilities, radio facsimile and cable communication equipment. The industry's annual production output now totals over half the whole electronics industry's output value.

Sun Feng, president of the new corporation, told XINHUA, "Our corporation will work with production and research institutes and universities, and develop flexible investment and management terms, in a bid to accelerate the development of China's radio and TV industry."

"Under the principles of equality and mutual benefit," he said, "our corporation will strengthen technological cooperation with foreign firms and institutes, and provide them with various services."

"Our corporation will help Chinese enterprises import new technology, key equipment and component parts," the president said, "and will provide economic information and technological consultancy services for domestic and foreign customers."

/9604
CSO: 5500/4151

BRIEFS

DIRECT DIALING TELEPHONES IN JIANGSU--Nanjing, 15 Mar (XINHUA)--Direct-dialing service is sweeping in rural areas of east China's Jiangsu Province, according to a local official today. To date, the service has been made available to rural subscribers in 11 counties of the province, said Zhu Youquan, director of the Provincial Administrative Bureau of Posts and Telecommunications. There are nearly 170,000 telephones in the province, of which 80 percent require operators to make a connection, the director said, adding direct-dialing services will spread throughout the countryside of the province by 1990. In 1990, telephones will total 300,000. That would make a ratio of 1.1 telephones per 200 peasants, compared with 0.66 of 1986. The director also said that the province encourages county governments, enterprises and individuals to invest in promoting rural telecommunications. [Text] [Beijing XINHUA in English 1451 GMT 15 Mar 87] /9604

TELECOMMUNICATION WITH FOREIGN COUNTRIES--Beijing, 19 Mar (XINHUA)--China has formed a telecommunication network involving more than 2,000 channels linking over 200 countries and regions, officials from the Ministry of Posts and Telecommunications said. Based on telecommunication satellites, China has set up direct international lines carrying telex, international telephone and public telegram messages with 45 countries and regions. By the end of last year, China had opened 1,300 direct international telephone lines, 750 telex routes, and 70 public telegram links, according to the officials. The communications equipment has been updated. Last year Beijing and Shanghai built computer-controlled switchboards. At the beginning of 1985, seven out of every 10 international telephone circuits in China were semi-automatic. Now 5,700 international telex routes in China's 50 cities are operated by computer-controlled switchboards, the officials said. [Text] [Beijing XINHUA in English 1052 GMT 19 Mar 87] /9604

OPEN ZONES IMPROVE TELECOMMUNICATIONS--Beijing, 27 Mar (XINHUA)--China's 14 open coastal cities and four special economic zones (SEZ) have greatly improved their telecommunications services. They have built facilities for 520,000 telephone lines, 152,000 more than in 1983, according to the Ministry of Posts and Telecommunications. Among them there are 6,000 automatic and semi-automatic dialing circuits for long-distance services

which have already been put into operation and 5,800 telex lines, four and 24 times more, respectively, than in 1983. As pioneers in the implementation of its policy of opening to the outside world, China has set up the special economic zones and designated the open coastal cities to attract foreign investment, introduce up-to-date technology and management experience from abroad, and promote foreign trade. So, these cities have in the past few years speeded up the buildup of telecommunications facilities to improve investment conditions. These cities can now provide direct telephone dialing and telegram exchange services with more than 200 cities in more than 40 countries. [Text] [Beijing XINHUA in English 0903 GMT 27 Mar 87] /9604

CSO: 5500/4151

DIRECTOR OF COMMUNICATIONS ENGINEERING FACTORY EXPLAINS GOALS

Budapest HIRADASTECHNIKA in Hungarian No 11, 1986 p 481

[Letter to readers, dated 3 Sep 86, from Frigyes Berecz, Director General of the BHG, the Beloiannisz Communications Engineering Factory]

[Text] This issue of HIRADASTECHNIKA contains articles by the outstanding technical experts of the BHG Communications Engineering Enterprise which discuss several questions of our timely developmental tasks.

The BHG--as part of the Hungarian communications industry--must solve two main tasks in our present age.

On the one hand, by delivering good quality, reliable equipment which reaches the technical level of the age, it must lay the foundations for an expansion of the development of domestic telecommunications.

On the other hand, as one of the "driving branches" of industry, it must aid the restoration of the balance of the national economy, an increase in national income and an acceleration of industrial development.

Is it possible for us to solve our tasks successfully? Success has many preconditions. Of these one of the most important is the "human factor" and within this the knowledge and creativity of researchers, engineers and technicians. The lack or limited availability of the other preconditions can be counterbalanced only by outstanding intellectual performance.

Before all else it is business success that ranks a technical creation. But the careful, accurate, understandable formulation and systematization of technical ideas, of new achievements, making them a common treasure, are also important, indispensable parts of engineering activity and significant proofs of creativity.

Communicating what we know and studying the works of other experts make it possible to avoid duplicating developmental work.

This way it becomes possible to solve more tasks with relatively less strength and to shorten the interval between posting a developmental task and bringing a new product to the market.

The ten authors of the six articles speak primarily to experts in switching technology, broadcasting technology and electronics manufacturing technology. But taken together what they have to say provides us with a characteristic cross section of the product development efforts of the BHG, and since the products of our enterprise are important system elements for telecommunications equipment the articles may be of interest to all experts in the communications industry and in telecommunications. He who reads through all of them will agree with me that they are worthy of attention and recognition.

8984
CSO: 5500/3013

EP PRIVATE BRANCH EXCHANGE FAMILY

Budapest HIRADASTECHNIKA in Hungarian No 11, 1986 pp 482-491

[Article by Bela Molnar, Developmental Institute of the BHG Communications Engineering Enterprise: "The EP Branch Exchange Family." The first paragraph is the Hungarian language summary.]

[Excerpts] In the past 5 years the BHG Communications Engineering Enterprise has manufactured, sold and placed into operation model EP 128 branch exchanges suitable for serving about 120,000 extension lines and model EP 512 branch exchanges suitable for serving about 60,000 extension lines. In the meantime new models have been developed (EP8M, EP32M and EP64M) thanks to which he family is now complete; that is, the economical satisfaction of needs in the capacity range from 4 to 6,000 extension lines has become possible. In this article, in addition to describing the chief technical parameters of the members of the EP branch exchange family, the author describes the results of the continual further development of them and even turns to those solutions which resulted in putting developments into production more quickly than earlier.

2. Manufacture of the QA96/MRK Branch Exchange

Within the framework of the enterprise reconstruction carried out in the Fifth 5-Year Plan--although this was not its most important goal--there was a modernization of some basic electronic technologies, such as manufacture of printed circuit base panels, assembly of them and, in part, testing of them. The final assembly and testing of the QA96/MRK of the "QA plant" were based on this. Lacking material and intellectual resources, the final testing philosophy was based on the testing in the plant of finished telephone exchanges, completed according to a concrete order. This may not be the most economical solution and it disturbs the mass nature of production but it has, and especially it had, tremendous advantages too.

First among the advantages is the fact that with the above method there developed, wanted or not, an intellectual capacity which could be used in the solution of the systems level problems of the TPV [stored program controlled] equipment. An immediately measurable advantage of the method is that with a complete test of the equipment at the factory the specific time needed for on-site assembly and putting into operation, always accompanied by extra expense, is greatly reduced. The latter is not assembly work in the traditional sense

but rather an activity requiring high level intellectual preparation and based on a knowledge of the equipment, the capacity for which developed also. As a result of all this the "telephone culture" spread to a considerably wider circle than in the case of a subassembly level factory final test, which is certainly more modern from the strictly manufacturing angle.

There is yet another great advantage to the above method which could be felt even with the QA96/MRK exchange. A significant number of customers are willing to pay a price which is significantly higher than for a crossbar exchange only if their needs are precisely satisfied from the side of both quantity and quality (services). The TPV technology is suitable for this, and the QA and EP exchanges are especially suited for it, as we will show with examples in Chapter 3. In practice this means that the manufactured exchange can be regarded as nearly 50 percent of the custom equipment. These and their new hardware and software modules must be designed and all the equipment must be tested. An equipment level final test proved most suitable for this, given our possibilities. Actually, even for equipment not listed in the custom category it is necessary to get acquainted with the concept of software manufacture. Tools for generation of the customer specific databases of the exchanges (data depending on site) were available, but the shortage of equipment and the intellectual capacity available do not make possible a complete emulation test of these. So the equipment level test was called on to do the final test of this too.

Naturally there are (and were) available for final testing those diagnostic, fault defining test programs which form an organic part of the shipment. But effective use of these presumes correct operation of the control processor. Thus, beginning with QA manufacture, a special device facilitated and made effective the testing of the MAT512 processors--the MAT512/2 processors beginning with the EP exchanges. The subassembly level permanent burning of the processors is done on this too. Series manufacture of the QA96/MRK began under these conditions in 1979, after semi-operational series manufacture of 3,000 lines worth. By the end of 1981 another 30,000 lines worth had been made. In regard to its system technology structure the QA96/MRK coincides with the EP 128 model, which we describe in detail below.

3. The EP 128 Branch Exchange As The Oldest Member of the EP Exchange Family

A block diagram of the EP 128 can be seen in Figure 1. Functionally the system consists of three main modules--line and signal transmitting and receiving interfaces, the electronic switching field and the MAT512/2 control processor.

In connection with the block diagram we call attention to the great similarity to the EP 512. The EP 128 and EP 512 can be regarded as one subsystem--switching block. The switching field structure is similar also; the difference is in the size of the C matrixes. These always have an 8 x 8 size, so the given 128 inputs (terminals) can be accessed by two each possible paths from the 64 C-C links (Figure 2). The switching field--including the circuits needed for controlling, maintaining and checking it--can be made up of three different types of cards (TR, MC and HOM). A maximum of four of the 128/64 modules of the switching field can be connected to one another through the C-C links. This gives the typical maximum structure of 512 terminals.

The largest expansion unit of the exchange is the 128 terminal central part placed in a 30E high KONTASET cabinet. We designated this subcabinets 1A through 4A, there being no control in any of them (Figure 1). In these one can locate the line interfaces in the KP's (Central Panels) at spots pre-cabled to the terminals (Figure 3). In Figure 3 we have also shown the schematic connection of the most typical line interface.

An MAT512/2 miniprocessor controls the exchange. The "/2" designation refers to a modernization carried out in 1981 compared to the original type used in the QA96/MRK. At that time we introduced 8 K byte RAM and 16 K byte EPROM cards in place of the earlier 2 K byte RAM and EPROM cards. This made it possible to use the 64 K byte memory, which earlier was only a theoretical possibility, and with smaller mechanical dimensions. So, compared to the QA96/MRK, we increased the sphere of memory using services and, with new test programs, the support of operations.

Since 1982, zero series manufacture of the EP 128, more than 1,000 units of the MAT512/2 processor have been manufactured. Although prototype level testing of more modern solutions is taking place now--series manufacture of them has actually begun (see Chapter 5)--it is not at all a simple task to redeem the software systems developed for the MAT processor and the intellectual capital invested in the support systems used to develop and manufacture them.

The MAT512/2 processor is placed in a mechanical unit 10E high which we place in the so-called "VA" cabinet which today is exclusively 30E high. The reason for this is that in the course of the continual further development of the EP 128 many new hardware modules have been developed and room had to be provided for them.

4. Continual Further Development of the EP 128 and EP 512 Exchanges

A detailed description of the EP 512 exchange can be found in a previous article (Bela Molnar, "The EP 512 TPV [stored program controlled] Electronic Branch Exchange," HIRADASTECHNIKA, No 10, 1985, pp 433-444). We will not turn to this here. Use of the software system described in that article has become general for the EP 128 as well, with special regard to the call processing system. This is essential, because in many cases further development means the development of new services which can be realized by purely software means, so the service sphere of both models can be expanded at once. Of these services there was especially great business success for the creation of a group category of extensions. As examples we mention the following use areas.

In hotels, right up to most recent times, separate telephone exchange divisions served the so-called hotel part and the so-called operations part. The hotel rooms and service areas were connected to the former and the hotel operations and administration sections were connected to the latter. The "switch-over trunks" between the two telephone exchange divisions, which were independent in regard to switching technology, limited the traffic from the second part to the first. This solution is obviously much less economical than the one we realized in the EP exchanges by purely software means; namely, we limited traffic between terminals deliberately put on the hotel room and service lines, refining this with automatic and semi-automatic switching. It

is possible to introduce further limitations in regard to various connections between and/or within groups of extensions of various categories developed in this way. (For example, it is possible to forbid room-to-room automatic connections in nighttime hours, from a built-in clock.) Such and similar services were very successful with other special users--in a way that you might imagine.

Another service in the group category is the so-called boss-secretary service. This provides members of the group the same as systems requiring separate equipment and sets--disregarding the information provided by the in-use lamps on the boss-secretary sets. (In English language literature they call this service "call screening" which better expresses the essence.) The essence of the service is briefly as follows.

Extensions assigned to a given boss-secretary group can call each other with "abbreviated" numbers (e.g., with a single digit one and then this goes to the other extension of the branch exchange with a prefix). The members of the group can be in the "boss" or "secretary" category. If a call transfer is made from a boss set to some secretary line the "call screening" begins to operate; i.e., the transfer has no effect on calls within the group, the secretary can still connect these to the boss (or bosses) with a call back transfer. An "individual use" main line (or lines) can be assigned to the group also; from the viewpoint of use this can provide all the possibilities of independent boss-secretary systems.

In the course of the continual further development of the EP exchanges some new hardware modules have been developed also. In general these require development of new software modules as well--at least at the automatic signal receiving level, SIGN. (There are already 13 software packages in production for the EP 128 exchange.) In the following examples we describe the "adaptability" of the EP exchanges with the most characterstic variations of these.

Figure 4 shows supplementation of the branch exchange with dial-in using a three wire direct current signal system.

The supplementation consists of a BAP unit, VJ2, LT3, KP, PAB and PCA circuits placed in the BAP unit, and BTPV circuits located at the terminal sites of the KP circuits of cabinets 1A through 4A.

The BAP unit can be placed in the 20E high empty space of the VA cabinet. The 8E high card case contains one VJ2 circuit, one or two LT3 circuits depending on the number of lines and one to five KP circuits. Six each PAB's and PCA's can be put in one KP circuit, so if five KP circuits are used then one BAP unit provides connection for a maxiumum of 30 dial-in lines. Not shown in the figure is the secondary power unit which produces a -60 V supply voltage in addition to the plus or minus 5 V and +24 V supply voltages (because of the signal system which requires a -60 V voltage). The VJ2 and KP cards are identical with the standard cards for the exchange. The LT3 scanning circuit is a -60 V supply voltage version of the LT1 circuit; its operation and design are the same as for the LT1 circuit. The PAB circuit connects the "a-b" branches of the dial-in line and participates in transmitting and receiving

the direct current line signals. The PCA circuit handles the "c" branch of the dial-in line. The BTPV circuit makes possible transmission of various information sound signals and it connects the "a-b" branches of the dial-in line to the terminals of the electronic switching field.

Figure 5 shows the branch exchange hardware supplementation with hotel services. According to the figure the supplementation consists of a bill printer, a fee recording unit, hotel service sets and SAV circuits placed in each of the 1A through 4A cabinets.

The control unit controls the bill printer through the VJ2 and SAV circuits. Signal exchange between the SAV and the bill printer takes place with 20 mA circuit loops in the "pingpong" mode. The fee recording unit contains 12 or 16 kHz fee recorders which transform the 12 or 16 kHz fee pulses arriving from the main exchange into direct current (ground) signals.

The hotel service set is a set supplied with a call number store (HSZ) assigned to room service. In the absence of the personnel this device automatically stores the number of the extension requesting service which the personnel can read on their return and can immediately begin to answer the requests of the guests. The HFT supplies power to the device.

Another important area of further development is use in networks for private purposes. With the supplementation shown in Figure 6 the EP exchanges can be connected to the superordinate exchange as a terminal exchange, in a manner similar to an ARF exchange.

The TT2 circuit provides the necessary connection to a two-wire linesupplied with a separate signalling channel. In general it is used in the case of pulse (150, 600 ms) line signals. The TTK unit consists of one 8E high card case, which can be placed in the VA cabinet. The TTK card case can contain a maximum of five KP2 circuits. A maximum of four TT4 circuits can be put in one KP2 circuit. There is one signal transmitting site (JA) and one signal receiving site (JV) for every TT4 circuit. The design of the KP2 circuit is the same as the design of the KP circuit, but it does not contain an operating circuit because it is not in direct contact with the control unit. The TT4 circuit supplements the TT2 circuit; it makes possible connection to a four-wire line with a signalling channel. With a suitable signal transmitter and signal receiver located at the JA and JV sites belonging to the TT4 circuit it is possible to use a signalling channel below its own band on a two-wire line. These are 100 or 25 Hz signal transmitters and receivers respectively.

The KAV unit consists of one 8E high card case which can be put in the VA cabinet of the EP 128 exchange. The KAV unit can contain a maximum of eleven code transmitting-receiving circuits--MFC-A and MFC-B. The MFC-A circuit is the "outgoing register" of the inter R2 MFC register signal system and the MFC-B is its "incoming register." These connect to the terminals of the electronic switching field through the AP circuit.

The hardware modules just described, providing network cooperation, are 5-10 percent new--in regard to manufactured subassemblies--compared to the standardized subassemblies made primarily for branch exchange use. With them,

and naturally with the appropriate software packages and user specific data, we can make very useful equipment. In general these are so-called mixed exchanges in which, in regard to both line connections and services, we integrate into one another a rural terminal exchange and a branch exchange which earlier attached to it as separate equipment.

Taken together the result of the above was that up to the end of the first half of 1986 we had sold 120,000 lines worth of the EP 128 production which started in 1982 and 60,000 lines worth of the EP 512 (Figure 7) production which started in 1983.

5. Small Capacity EP Exchanges; the EP8M, the EP16M, the EP32M and the EP64M
As appears from the earlier chapters the MAT512/2 processor, standardized for the EP 128 and EP 512 exchanges, has been in continuous production for 7 years. For these exchanges--disregarding secondary parameters such as consumption--the control used is not really definitive in regard to the technical-economic indexes of the complete exchange, either from the viewpoint of manufacture or marketing. Even with the smallest--100 line--EP 128 exchange the switching technology parts, in the narrower sense, and the power supply dominate from the viewpoint of manufacture, marketing and operation. But on the basis of technical-economic analyses done earlier it turned out that one could not realize economically a smaller capacity (30-60 line) exchange with the MAT512/2, all the more so because the users install these with more modest operational security conditions (without stand-by power, not in a separate, closed facility, etc.). A small capacity exchange would become "top heavy" in every respect because of the MAT512/2 processor.

Going beyond the above--in the name of general renewal and the continual modernization of products--the BHG proposed the development of a modern control system based on a microprocessor and on available LSI IC's to the maximum extent. This was the EXCEL. It is hardware compatible with the control systems based on the MAT at the TTL level outputs and inputs of the VJ2 control coupler cards connecting to the MAT BUS. Physically this EXCEL system is realised with PJ cards, which are the same size as the VJ and they also include a 64 K byte control card based on an 8085 CPU (Figure 8). This proved suitable for realizing an assortment of services "compatible from above" with those of the EP 128 and EP 512 exchanges in the range below 100 lines. This is thanks in part to the fact that we also developed a new operator set in which management of keyboard and displays and control of communication via the 20 mA loops takes place with the aid of an 8085 CPU. Even in the present domestic technical-economic environment this solution proved cheaper than the earlier one, when we used for this purpose a control with wired logic developed from MSI's.

The switching technology parts--switching field, line interfaces--of the EP32M and EP64M exchanges were developed having as a goal maximal use of the EP 128 and EP 512 card assortment. This succeeded almost completely. It did become necessary to design one new card; the HOM cards containing 8 or 16 linking circuits and, in part, the TR cards connecting the 32 terminals proved too large. So we developed a mixed (PP) card out of the circuits of the TR, HOM and KDV cards (Figures 9 and 10).

In the EP32M and 64M exchanges the switching field is one or two stage--in harmony with the requirements for handling the traffic. (That is, in this capacity range the incoming calls must be handled strictly without loss.)

In the case of the EP32M exchange the smallest capacity range which can be satisfied economically is 10 extensions and 2 main lines. The number of cards cannot be reduced below this because of the design of the KP. To satisfy needs below 10 lines we developed the EP8M and EP16M exchanges (Figure 11), with different card sizes from the EP32M--EP 512 design but corresponding to the Europa system and with an inverse DIN 41612 connector, but with circuit solutions characteristic of the EP family. Thus we can cover all the needs appearing in practice with exchanges made on the basis of the same principles and largely on the same design base.

6. Summary

We summarize the chief technical characteristics of the EP exchange family as follows:

6.1 Capacity Range

Model	Number of Extensions	Number of Main Lines	Number of Operator Sets
EP8M	4-8	1-2	--
EP16M	8-16	2-4	--
EP32M	10-32	0-8	0-1
EP64M	30-64	0-12	0-1
EP 128	60-450	0-128	0-4
EP 512	400-6,000	0-600	0-60

6.2 Electric Parameters

--Maximum loop resistance of extension lines which can be connected (with set), 1,500 Ohm;
--Minimum resistance of leakage to ground, 20 kOhm;
--Maximum line capacitance, 0.5 microfarads;
--Frequency and signal relationship (open/close) of pulses given by dial in case of a dialing set:
    --in case of 1,500 Ohm loop resistance, 10 plus or minus 1 Hz
      (1.6/2.2) : 1
    --with or below 1,200 Ohm loop resistance
        in case of 10 plus or minus 2 Hz (1.4-2.2) : 1
        in case of 10 plus or minus 1 Hz (1.2-2.4) : 1
      minimum time between pulse sequences, 350 ms;
--In case of pushbutton (DTMF) set the signal frequencies correspond to the CCITT Q 23; minimal length of codes is 60 ms, minimal pause between codes is 60 ms;
--Frequency of signalling tones is uniformly 425 plus or minus 25 Hz, sinusoidal,
    --dial tone: -10 plus or minus 5 dB, continuous,
    --busy signal: -10 plus or minus 5 dB, 300 ms signal/300 ms pause,
    --ring tone: -10 plus or minus 5 dB, 1200 ms signal/3600 ms pause,

--waiting tone: -10 plus or minus 5 dB, 100 ms signal/100 ms pause, 100 ms signal/500 ms pause,
--security tone: -20 plus or minus 5 dB, 100 ms signal/300 ms pause, 100 ms signal/2500 ms pause,
--warning tone: -10 dB plus or minus 5 dB, 200 ms signal/500 ms pause;

The periodicity (signal/pause ratio) of the above tones can be set to values different from the above by software means;

--Battery supply bridge, an inductive bridge from 0 or -48 V nominal voltage with 2 x 480 Ohm resistance (EP32M through EP 512) or a 22 mA plus or minus 2 mA stable current active bridge (EP8M and EP16M);
--Ring sensitivity of main lines, 30-110 V_{eff} in case of 25 Hz;
--Minimum loop resistance shown by main lines in rest state, 1 MOhm;
--Loop resistance shown by main lines in speech state, 300 Ohm;
--Frequency of pulse sequences given on main lines, 10 plus or minus 1 Hz; signal relationship (1.8/2.2) : 1 (open/close), time between pulse sequences, 800 ms;
--Insertion attenuation of exchanges between 600 Ohm terminations measured at 800 Hz in the extension-main line relationship is a maximum of 0.8 dB; it is smaller than 1 dB in the entire speech band (300-3,400 Hz);
--With 600 Ohm terminations at 1,100 Hz between any two connections established within the exchange the crosstalk attenuation is greater than 70 dB;
--Asymmetric attenuation relative to ground is no less than 42 dB in the 0.3-0.6 kHz band or 46 dB in the 0.6-3.4 kHz band.

7. An Expression of Thanks

The developmental, manufacturing and marketing achievements outlined above are the result of collective work--done for the accelerated product structure exchange at the BHG in the past 5 years. The author of the article expresses his appreciation--also in the name of the collective of the BHG Developmental Institute--to all those who enthusiastically and effectively cooperated in the technologization, manufacture preparation, manufacture, assembly, putting into operation and sale of the EP exchanges. And we express the hope that this enthusiasm will persist and--coupled with yet greater efforts--will be in the future also a determining element in the general process of renewal.

The author of the article takes this occasion--in the name of the entire collective of the BHG--to express appreciation to the Hungarian Post Office Experts for the professional conduct of their official approval tests and the useful observations made in the course of these. Special thanks goes to Miklos Melbinger, chief development official of the MKP, who guided this work professionally, and to Aladar Arato, the technical-economic consultant of the operations department.

Biographic Note

Bela Molnar obtained his engineering degree in the instrument and control technology section of the Electrical Engineering School of the Budapest Technical University in 1965. He began his work at the BHG, his chief themes in the early years were IT3 Rotary remote selection and ECR electronically controlled crossbar rural exchanges. Since 1970 he has been dealing intensively with development of telephone exchanges equipped with stored program control. From 1978 he was chief of the switching field development

department of the BHG Developmental Institute and since 1982 chief of one of its switching technology development main departments. This main department developed the QA96/MRK, QA512/MRK. EP 128 and EP 512 exchanges, in addition to other switching technology developments.

FIGURE CAPTIONS

1. p 483. Block diagram and circuit diagram of the EP 128.

2. p 484. The switching field. Figure 2/a shows the link connections of the switching field of the EP 128. Figure 2/b is a photograph of an MC card.

3. p 485. Location of line interfaces. Figure 3/a shows typical wiring of the KP (common panel). Figure 3/b is a photograph of the EP 128 sub-cabinets.

4. p 486. Realization of dial-in with a three wire DC signal system.

5. p 487. Typical supplementations for hotel exchanges.

6. p 487. Connection to EP exchanges of trunks operating with MFC R2 inter-register and 150/600 ms pulse line signals.

7. p 488. An EP 512 exchange set up for final testing (photograph).

8. p 489. Block diagram of control card (PJ2) of the EP32M and EP64M exchanges.

9. p 489. Circuit diagram of the EP32M exchange.

10. p 490. Circuit diagram of the EP64M exchange.

11. p 490. An EP8M exchange with all subassemblies (photograph).

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THE TERMES REAL-TIME OPERATING SYSTEM FOR SWITCHING TECHNOLOGY

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[Article by Dr Gabor Toldi, Dr Tibor Veress, Gabor Balla and Peter Lakatos, of the BHG Developmental Institute: "The TERMES Real-Time Operating System for Switching Technology Use." The first paragraph is the Hungarian language summary.]

[Text] The article describes the TERMES real-time operating system developed at the BHG Developmental Institute. It was developed primarily for switching technology use but also can be used advantageously in systems for other purposes. In the article the authors describe the requirements and goals taken into consideration in the course of development and then describe in detail the realization of the several functions and their operation.

Introduction

The development of stored program controlled telephone exchanges has been going on at the BHG since the beginning of the 1970's. The increasing competition struggle on the international market prompted the enterprise to satisfy ever more quickly and more completely the special individual customer needs. It could react to these challenges with sufficiently swift developments only if the principle of modularity, the building block view, was implemented ever more consistently in the development of the several product families.

On the other hand because of the finite ability to sum up the creative element the development of ever more complex equipment satisfying high demands is possible only if we can think of certain functions as well defined, existing building elements in the several phases of designing and so can divide up the problem vertically. This requirement also can be satisfied thanks to the modular construction of equipment.

The principle of modularity itself is not new at the BHG; we experienced the advantages of the building block view in connection with the QA-EP branch exchange family. But while the earlier solutions concentrated primarily on modular hardware the complexity of the software of the equipment grew to such an extent that strict application of the building block view is now indispensable here also.

The result of development over the past few years in the hardware area is a new generation microprocessor control system, the EXCEL (EXchange Control ELements). Thanks to its modular construction and modern design it is suitable for development of telephone exchanges of various sizes and of control systems for equipment for other purposes.

To aid the use of the EXCEL control system for various purposes we developed the TERMES (Telephone Exchange Real-time Multitasking Executive System) operating system; thanks to its modular construction, well defined interfaces and building block character it supports the development of modular software systems to a great degree.

We will deal with the TERMES operating system in the next part of the article.

Developmental Goals

The TERMES was prepared primarily with the goal of providing the operating system functions in EXCEL based control systems for the most varied telephone exchanges. So we were talking about a real-time process control system which had to handle many processes (on the order of 100, due to the nature of switching technology) in parallel, with strict real-time requirements.

During development, naturally, we kept in view utility in systems for other purposes (not switching technology). The system had to have sufficient flexibility, an ability to be configured according to the given needs.

The system had to be open, in the sense that other functions could be built on easily, as external shells of the operating system.

The system had to connect to the hardware specialities of the present EXCEL controls, e.g. the 8085 microprocessor.

The system had to support development of applications programs. The ability to use an existing microprocessor development environment would be desirable; this includes ensuring compatibility with the PL/M-80 high level programming language.

Last but not least, in the spirit of the introduction, the system had to have a strictly modular construction. The several modules had to have well defined, and if possible simple, internal and external interfaces. The breakdown into modules is good if the individual modules realize well defined, easily described functions. The individual modules should, if possible, completely cover the given function because otherwise it will be unavoidable to have modules with identical or similar purposes and nonmodular elements in the systems. On the other hand the modules should, if possible, realise simple functions because in the contrary case the modules become too complex, which represents a superfluous burden in most applications. For these reason special attention must be turned to the breakdown into modules and to defining the functions of the several modules.

The Chief Functions of the TERMES

The TERMES is a process oriented operating system in which the system provides one virtual processor for each of the tasks realizing the several processes.

Thus the individual processes can be, to a large extent, independent of one another and the tasks will "feel" that the processor is exclusively their own. Thus the programs for the tasks will not be complicated by being put into a multitasking environment.

The chief functions of the TERMES are the following:

a. Most important, it creates virtual processors for the processes to be handled. On the basis of the so-called scheduling algorithm it divides up the physical CPU time among the tasks thus ensuring the quasiparallel running of the processes (the Scheduler).

b. The TERMES offers a solution for coordinating and synchronizing the running of the processes (the Semaphore Manager).

c. The TERMES provides a tool for developing communication links for the processes (the Mailbox Manager).

d. The TERMES provides a uniform method for realizing the connection of the external environment and the processes (the Interrupt Manager).

We have given the names of the TERMES modules beside the four basic functions. The sphere of basic services corresponds to the usual functions of real-time systems.

The TERMES Modules

The TERMES is an object oriented system. This means that its several functions are realized in the form of operations interpreted in object types of a given structure. They are unique tools for operations being done on objects.

There are five object types in the TERMES to realize the functions: the task, the semaphore, the mailbox, the segment and the interrupt exchange objects. We will describe the structure of these with the several modules.

A sphere of operations is interpreted as attached to every object type. Operating system routines realize these operations. These system routines are formally PL/M compatible procedures which can be accessed, called (system calls), for the applications programs.

In the following we describe the several modules of the TERMES.

The Scheduler

The parallel running of processes in the TERMES is apparent, for the system runs on one processor, strictly speaking only one process runs at one time. The apparent parallelism derives from the fact that the physical CPU is assigned to the individual processes for only a brief time, executing them in turn. To put it differently, the system provides a virtual processor (task) for the several processes for the purpose of preserving the current states. A physical CPU is provided for a brief time to the virtual processors in turn. At such times the state of the virtual processor is loaded into the physical CPU and the process actually begins to run. After a given time (or if the process is forced to wait) the system saves the new state of the physical CPU

to the virtual processor, the CPU is assigned to another virtual processor (task), and so forth.

The task of the Scheduler is to divide up the physical CPU time among the competing tasks. This is done on the basis of the so-called scheduling algorithm. There can be a maximum of 255 tasks in the system. Each task is supplied with a priority attribute which approximately expresses the chances it has in competing for CPU time. A maximum of 255 priority classes can exist in the system; this is a configuration parameter in the hands of the user. The Scheduler table expresses what advantage or disadvantage belonging to one of the priority classes means. The length and the loading of the Scheduler table are free configuration parameters.

The Scheduler does the scheduling at given intervals (system clock, a configuration parameter) or when a running task is forced to wait. At such times the priority class is established from the next line of the Scheduler table, from which the next task ready to run is started. The tasks ready to run--grouped according to priority classes--wait for CPU time, that is for the Scheduler to schedule them, strung in so-called ready chains (see Figure 1). If the ready chain of a scheduled priority class is empty, that is if there is no task ready to run in the given class, then the Scheduler selects from the priority class lower by one. In essence the ready chains are FI-FO (first in, first out) waiting lines.

By appropriate loading of the Scheduler table the user can influence the relative frequency of the scheduling of the several priority classes.This represents a high degree of flexibility. We give three simple cases as examples:

a. We get a simple priority system if we write the highest priority in a single line of the Scheduler table and give every task a different priority attribute. Thus the lower priority tasks can run only if none of the higher priority tasks are ready to run.

b. We get a simple "round robin" system if we give all the tasks the same priority. In this case the Scheduler schedules the task which has been waiting longest for the CPU.

c. We get scheduling largely corresponding to the binary line if we write the highest priority class into every second line of the Scheduler table, a priority class lower by one into every intervening fourth line, etc. Thus the priority class lower by one has about half the chance for CPU time as the higher.

The other important task of the Scheduler is to manage the timed waiting of tasks. The timed tasks wait strung in a so-called time chain sorted according to the absolute time of the expiration of the timing. At such times the tasks do not figure in the ready chain and so cannot be scheduled.

At every scheduling cycle (more precisely, every clock stroke) the Scheduler compares the status of the 16 bit system clock with the absolute waiting time of the first waiting task. If the given time has passed the task goes from the

time chain to the ready chain corresponding to its priority and from then on participates in the competition for CPU time.

One can also create more than one time chain in the system (a configuration parameter). In this way the length of the time chains can be moderated, reducing the time losses accompanying stringing to a sorted chain.

In the system the clock stroke is actually a periodic interrupt which operates the Scheduler. The period of this is a configuration parameter; the smaller it is the better is the time resolution of the system but the greater is the relative overhead accompanying the running of the Scheduler. A good minimum appears to be a period of about 10 ms, which is also advantageous in telephone technology applications.

The Task Manager
The Task Manager contains the system routines connected with the task object and the Scheduler.

The functions realised are:

--Querying the current priority of the task (TS$GPRI);
--Changing the current priority of the tasks (TS$SPRI);
--Querying the identifying address (token) of the task (TS$TOKN);
--Causing the task to wait for a given absolute time, that is until a given status of the 16 bit system clock (TS$WAIT);
--Delaying a task for a relative duration, that is until the expiration of a number of clock strokes (TS$DLAY);
--Suspending the running of an optional task (TS$SUSP); and
--Resuming the running of a suspended task (TS$RESM).

It contains the chain parameters serving to place a task object on the task exchange chain (see below), the current and maximum priority attributes and the status of the task (ready to run, timed, waiting, suspended, etc.).

The Semaphore Manager
The function of the Semaphore Manager is to realize synchronization of the tasks. The most fundamental synchronization schema among processes are mutual exclusion (e.g., exclusive access to common resources), the consumer-producer schema (e.g., buffer handling) and event signalling synchronization (e.g., starting at once on a given signal). There is ample discussion of these in the professional literature.

The TERMES Semaphore Manager offers the functions of all three basic schema. The several functions are realized as operations interpreted on a so-called semaphore object. In essence the semaphore object consists of a 16 bit counter and an exchange chain list heading. The counter records the available number of abstract resources. The tasks can request available resources or can give back, and free, resources already requested. If a task requests more abstract resources than are available at the moment according to the semaphore then the task is strung on the exchange chain of the semaphore and goes into a waiting state until another task frees the desired quantity of resources on the given semaphore.

The organization of the exchange chains is of the FI-FO type, that is the tasks are served in the order of their "arrival." Waiting on the semaphore can be limited in time.

The operations realised are:

--Freeing abstract resources (SF$SEND);
--Requesting abstract resources with unlimited waiting (SF$RCIW);
--Requesting abstract resources with an absolute time limit (SF$RCAW);
--Requesting abstract resources with a relative time limit (SF$RCRW);
--Requesting abstract resources without waiting (SF$RCNW); and
--Loading the counter of the semaphore with an initial value, thus freeing all waiting tasks (SF$INIT).

With the above described semaphore objects and operations all three basic synchronization schema can be realized; the consumer-producer model is self-evident; we get the basic case of mutual exclusion if we work with one abstract resource; and there is a way to signal an event in the SF$INIT operation.

The number of semaphores in the system is limited only by the available memory.

The Mailbox Manager
The task of the Mailbox Manager module is to conduct the communication of the tasks within the processor. This function is realized by the segment and mailbox objects of the TERMES and by their operations.

The segment object is essentially a piece of memory of arbitrary length supplied with chain parameters into which one can place arbitrary information. The task having the role of information source, after it has filled a segment object with the information to be transferred, puts it into the corresponding operation mix mailbox object. The task having the role of information consumer appears at the given mailbox object for the segment object and takes it over; then it can evaluate the "message." The asynchronicity of the running of the source and consumer tasks is solved by the fact that any number of segment object messages can be placed in the mailbox object without a consumer task taking over the preceding ones. At such times the segment objects wait for the appearance of the consumer task strung on a so-called object chain. Similarly, if the consumer task (or tasks) appear too soon and there is not yet a segment message placed in the mailbox they are forced to wait strung on the exchange chain of the given mailbox. With the placement of the segment objects the waiting consumer tasks are freed.

Waiting at the mailbox can be limited in time, as we saw with the semaphore. Any number of source and consumer tasks can work on one mailbox (see Figure 2). The system does not provide identification of the sources (givers) on the consumer side nor does it sort the messages. But any number of mailbox and segment objects can exist in the system (within the limits of memory).

The operations realized are:

--Placing the given segment object in the given mailbox object (MB$SEND);
--Taking over a segment from a given mailbox with unlimited waiting (MB$RCIW);
--Taking over a segment from a given mailbox with an absolute time limit (MB$RCAW);
--Taking over a segment from a given mailbox with a relative time limit (MB$RCRW); and
--Taking over a segment from a given mailbox without waiting (MB$RCNW).

The mailbox object essentially consists of an exchange chain and an object chain list heading. The consumer tasks which arrive early can wait on the exchange chain and segment objects not yet taken over can wait on the object chain. Of the two chains one is always empty.

The Interrupt Manager

The task of the Interrupt Manager is linking and synchronization of the system tasks and signals from the external world. The IT routines start in the system as a result of the external signals (interrupts). These are not tasks, are not scheduled and cannot call system routines (with one special exception). Their running time should be short, substantially smaller than the period of the system clock. The IT can do primary processing, but if longer processing is needed it must make contact with a task (or tasks). This is possible via the object mechanism of the IT exchange.

The IT exchange is an object which works similar to a semaphore; its counter keeps track of the filling of a hypothetical (abstract) I/O buffer. Essentially it performs a consumer-producer type synchronization between the IT routine and the processing task. With appropriate interpretation of the operations the abstractly operating mechanism can be adapted for both input (from IT routine toward task) and output (from task toward IT routine) information flow.

The synchronization is realized in this way. If the IT routine runs ahead in the processing (the buffer is filled in the case of input or emptied in the case of output) then the IT is automatically disabled. If the processing task is the faster (the buffer empties in the case of input or fills up in the case of output) it is sooner or later forced to wait on the IT exchange. If the processing partner (IT routine or processing task) catches up then the disabled IT is authorized or the waiting task is freed. The counter of the IT exchange, which keeps track of the filling up (in the input case) or emptying (in the output case) of the hypothetical buffer, is supplied with an end value (which corresponds to the length of the buffer) and upper and lower margin values; crossing over these (filling or emptying the buffer) stops or restarts the process giving rise to the IT and in the extreme case forbids or authorizes the IT. The end value and upper and lower margin values are configuration parameters in the range 1-255.

From the viewpoint of the Interrupt Manager the lines of the hypothetical buffer can be in three states during operation:

a. In the realm of the IT routine, waiting to process an IT routine,
b. In the realm of the IT routine, but already processing by the routine, or
c. In the realm of the task, during processing.

In the course of operation the three states replace one another in a cyclic manner as a result of the operations of the IT exchange (see Figure 3). Accordingly we can divide the buffer into three domains. It helps understanding if we indicate the buffer with a circle (see Figure 4), the three sections of which represent the domains in the three different states. The domain boundaries, which in concrete applications can be designated by pointers in the buffer, move as a result of the several operations one buffer position in the direction indicated by the arrow. The size of the several domains can vary during operation--depending on the speed of task and IT routine processing.

An IT routine can be in contact with several tasks via several IT exchanges. But only one IT routine and, at a given moment, only one task can belong to one IT exchange. Before they are connected with an IT routine the tasks connect to the given IT exchange, thus ensuring exclusive access compared to other tasks. The connection with an IT routine of a connected task can be ended with a disconnect operation, thus permitting other tasks access to the IT routine. Since only one task can be connected to a given IT exchange at one time it is not necessary to chain the task waiting for the IT routine; a waiting line cannot be generated. Tasks waiting for connection are chained to the exchange chain of the IT exchange (see Figure 5).

The operations realized are:

--Connection with unlimited waiting (IT$CNIW);
--Connection request with absolute time limit (IT$CNAW);
--Connection request with relative time limit (IT$CNRW);
--Connection request witout waiting (IT$CNNW);
--Disabling the IT (IT$DISA);
--Enabling the IT (IT$ENAB);
--Taking over a buffer position from an IT routine without waiting (IT$TSNW);
--Taking over a buffer position from an IT routine with unlimited waiting (IT$TSIW); and
--Handing over a buffer position to an IT routine (IT$ACKN). If the lower margin is crossed over the IT is automatically authorized.

One can call only from the IT routine:

--An indication of the processing of a buffer position (IT$SIGN). If the upper margin is crossed over or if the end value is reached then the IT is automatically disabled.

The IT exchange object contains an exchange chain list heading, 8 bit counters, their end values, upper and lower margin values, a state word, an identifying address for the connected task (token), and the insert address of the IT disabling and enabling routines provided by the user. There can be any number of IT exchanges in the system within the limits of memory.

The Wboot

The TERMES is a so-called static operating system. This means that, unlike dynamic systems, the objects are defined exclusively in the compilation time; it is not possible to create or eliminate them in running time.

The task of the Wboot is to create in a RAM area before actual running the objects defined in the compilation time, to load them and chain the tasks to the appropriate ready chain. Thus the TERMES can also be operated in EPROM based systems. The user must write his objects in a macro language for the Wboot, the Wboot processes the code generated from this and loads the objects on the basis of this.

User Programs

User programs should be written in the PL/M or assembly language. The task programs take the form of an endless PL/M procedure, which can also have parameters. Programming the procedure master file itself is as in the case of traditional, sequential programming, as if the entire CPU would execute only that program. There is also a possibility for reentrant programming of common program tasks; this is especially important in switching technology.

The user should define his objects in a separate module. This can be done in a special macro language. Then the user modules (including the object definition module) are to be linked together with the necessary TERMES modules. The object code produced can be burned into EPROM or can be loadedinto RAM for testing.

A simple resident monitor program and the auxiliary programs of the development system support testing of user programs. The monitor program conforms with the TERMES system, the two can run side by side, so a running TERMES system can be tested with the aid of the monitor. The monitor communicates through the serial service line of the EXCEL controls with the development system, where the auxiliary programs display the messages of the monitor (see Figure 6). These auxiliary programs expand the services of the resident monitor and can make possible, for example, symbolic or task specific studies.

After testing the user programs the monitor can be left out of the system.

Further Development Possibilities

The TERMES is an open system. Layers realizing higher level functions can be built on its services--as a nucleus. One can define objects made of objects, so-called composite objects, and the operations interpreted on them can be defined using the operations for elementary objects. The layers thus developed can function as outer shells of the operating system.

A program package realizing interprocessor communication has been developed as such an outer shell. This is the NICE which makes possible the communication of the tasks of different processors in the local net (SERBUS) of the EXCEL system.

But one could also realize as an outer shell, for example, a file management system, and one could build additional shells on this and on the above communication shell, for example a multi-processor, distributed subscriber database management system (see Figure 7).

Evaluation

With consistent adherence to the principle of modularity and implementing the object approach we got building blocks for a real-time operating system which makes possible a speeding up of the development of real-time systems by building in tested solutions as finished constituent elements and offering tools for the most common problems of real-time systems. Thanks to its modular structure and well defined interfaces it aids the development of modular user systems. Thanks to its flexibility and the general nature of the functions realized it can be widely used in real-time systems for switching technology and other purposes. Some of its special aspects, such as parallel management of a large number of processes (tasks), the ease of realizing tasks with common programs, the high resolution in time and the 10 ms scheduling, make it especially suitable for control of telephone exchanges.

Biographic Notes

Dr Gabor Toldi obtained his electrical engineering degree in 1977 in the communications engineering section of the Electrical Engineering School of the BME [Budapest Technical University] and obtained his special engineering degree in communications engineering in 1979. He defended his technical doctoral dissertation in 1980 on questions of testing and launching special purpose microprogrammed computers. He has worked at the Developmental Institute of the BHG since 1977, specializing in control systems for electronic stored program controlled telephone exchanges and development of their system software.

Dr Tibor Veress obtained his electrical engineering degree in 1979 in the communications engineering section of the Electrical Engineering School of the BME and his special engineering degree in computer technology in 1981. He defended his doctoral dissertation titled "Fault Tolerant Control Systems in Switching Technology" in 1982. He has worked at the Developmental Institute of the BHG since 1979, in the Controls Development Department. His speciality is development of controls for electronic stored program controlled telephone exchanges and developmental environments for them.

Gabor Balla is a developmental engineer for the BHG Communications Engineering Enterprise. He completed his studies in the communications engineering section of the Electrical Engineering School of the BME where he obtained a degree in data and telecommunications in 1976. He has worked at the BHG since that year. He participated in the hardware development of a control unit for stored program controlled telephone exchanges, helping to put it into production. Recently he has been dealing with system software connected with the control and with the hardware-software developmental environment for stored program controlled telephone exchanges.

Peter Lakatos is a developmental engineer in the Developmental Institute of the BHG. He obtained his degree in the communications engineering section of the Electrical Engineering School of the BME in 1981. He has worked at the BHG since that year. Initially he participated in development of control systems for stored program controlled telephone exchanges; his later activity concentrated on the area of communication networks. Recently he has been dealing primarily with development of operating systems and communication software for control systems.

FIGURE CAPTIONS

1. p 493. Scheduling schema.

2. p 495. Communication of tasks through the mailbox.

3. p 496. State transitions of the abstract I/O buffer.

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MANUFACTURING TECHNOLOGY FOR LOTRIMOS OPERATIONS SUPERVISION SYSTEM

Budapest HIRADASTECHNIKA in Hungarian No 11, 1986 pp 499-505

[Article by Istvan Regoci, BHG Communications Engineering Enterprise: "Manufacturing Technology for the LOTRIMOS Operations Supervision and Maintenance System." The first paragraph is the Hungarian language summary.]

[Text] The article describes the manufacturing technology for the LOTRIMOS system which is suitable for operations supervision of telephone exchanges and networks of various manufacture and generations. It describes in detail the MICROTEST automatic testing equipment developed for static and dynamic functional testing of printed circuits. By describing the test program for the CPU and analog interface modules the author illustrates the use areas of the equipment.

The LOTRIMOS equipment is suitable for operational supervision of telephone exchanges and central networks of various manufacture and generations. The systems have the same hardware structure for different types of exchanges but are equipped with software depending on the type of exchange and the role it plays in the network.

The BHG has been manufacturing the TMS-OMS subsystems of the LOTRIMOS family since 1984. The equipment actually consists of modular, multiprocessor measurement data collection and evaluation systems built up out of cabinets containing 1,000 or 2,000 analog measurement points (cabinet types A1 and A2, see figures 1 and 2).

The equipment contains 30 types of LSI circuits and 40 types of SSI and MSI circuits. The number of card types is 14 and the number of card cases is seven. Every card is made on a 100 x 160 mm, two-sided, fiberglass, drill metallized, fine grained sheet; the connectors used are of the DIN 41612 indirect inverse system. The back panel wiring is wrapped; serial bus cables between the card cases create the connection. The mechanical design is built on the KONTASET system.

The basic feature of the equipment is modularity, which applies to both hardware and software. Two types of hardware module can be distinguished--microprocessor modules and interface modules.

The microprocessor modules have more or less the same structure. Their internal data traffic takes place on uniform address, data or control buses; the central unit, memory and I/O modules in the system are also standardized. The several processor types are:

--scanner, PR-S,
--preprocessor, PR-C,
--operator, PR-O,
--peripheral manager, PR-P, and
--direct interface manager, PF1-SC.

The interface card cases figuring in the system do not contain intelligence in themselves but can be controlled via the bus. The interface cases used are:

--input (analog), IF1-SC and
--direct interface output (contact), PF1-SC.

The advantages of modularity can be summarized as follows:

--greater reliability,
--a small number of types of parts,
--small need for reserve parts,
--simple testability,
--standardizable tests, and
--simple service and maintenance.

1. The Manufacturing Technology for the LOTRIMOS System

The LOTRIMOS system was the first product of the BHG to contain microprocessor modules. Compared to our earlier products this represented something new, and a difficulty, primarily in the area of testing technology. Lacking investment possibilities we had to solve the testing tasks with our existing equipment or with testing devices developed internally.

Figure 3 illustrates the manufacturing technology. The process starts with testing of the arriving parts. We subject passive elements and mechanical and electromechanical parts to manual testing based on statistical sampling.

We check the SSI-MSI integrated circuits with functional measurement of every unit and the memory elements with repeated heat cycles and functional tests. In the absence of testing equipment we convince ourselves of the correct operation of the LSI elements by dynamic functional testing of the assembled printed circuits. Considering that we build in every LSI-VLSI element mounted on a socket, the extra time for repair and exchange is insignificant.

The printed wiring sheets are important parts of electronic equipment. Bad base sheets can cause very complicated functional faults at the card, unit and system level, so it is essential that we test every base sheet visually and electrically. We do the shortcircuit and break test of the base sheets with the BARETEST automatic testing equipment (a product of the SZTAKI [Computer Technology and Automation Research Institute]).

The printed circuits are assembled with HOYONIC semi-automatic mounting machines, which is followed by wave soldering. In a few special cases we use manual mountng and soldering. We discover simple manufacturing and soldering errors with visual inspection.

We do the electrical calibration according to two methods:

--We subject the simple digital circuits and the analog interface bulk circuits to dynamic functional testing. The repair of faulty circuits is done on the machine;

--The printed circuits containing LSI circuits go through a two level test. First we check the correct operation of the service circuits (drivers, decoders, latches, etc.) by a series of static states without installing the LSI elements, or with limited dynamic functional testing. For this purpose we use the TESTOMAT (a product of the SZTAKI) or the MICROTEST equipment developed internally. According to our experience 90-95 percent of the card faults can be discovered in this phase. Following this, after installing the LSI elements, we perform a dynamic functional test on the MICROTEST equipment.

We test the power units being built into the LOTRIMOS equipment in the assembled state at manual test sites and we check the back panels of the finished card cases and the connecting cables on automatic equipment made internally (a shortcircuit and break test). The modularity of the system significantly simplifies the unit and system testing operation. The several units can be isolated functionally and connecting up to the test devices is very simple also. For this purpose we developed test connectors in the processor card cases, but we also use the background plugs of the serial internal bus and interface cases. With the aid of suitable peripherals or programs the processors themselves can be tested, then the serial internal bus and then the cooperation of the processors. Only following this is the data collection system checked. We do not have to build up the entire system here for thanks to the modularity the test surface can be tested part by part.

The chief testing steps (constituting a unit test) ar · the following:

--checking power supply;
--checking processor cases,
  base state, memory test, testing I/O elements;
--checking peripherals,
  line printer, display, floppy disk operation;
--checking interface cases; and
--system test with aid of built-in self-test and external testing devices.

For unit test and system test purposes we use special testing equipment (the E tester) made up of LOTRIMOS elements. This equipment can also be used for on-site assembly-service purposes.

Of the several steps in testing technology we will deal below with the electric calibration of the assembled printed circuits. I will describe the MICROTEST automatic testing device developed for this purpose and two applications examples.

2. The MICROTEST Digital Card Tester

The MICROTEST is suitable for static and dynamic functional testing of digital circuits. The equipment consists of a general purpose microcomputer and the programmable test surfaces which are connected. We connect to the system an ADP-2000 model Orion display and a DZM-180 (or MT-120) line printer. The archiving of tested, working test programs and reading them into the system take place with the aid of an EPROM programming module. The equipment has a modular structure so the hardware and software can be changed according to the user needs. An editor, assembler compiler, linking loader and disassembler aid program development; programming the equipment can be in Z-80 assembler or machine code.

Figure 4 illustrates the structure of the equipment. The universal control is made basically of elements of the BHG-LOTRIMOS system, with minor modifications. The modular control contains a Z-80 8 bit microprocessor with a fixed instruction set and has a maximal addressable memory area of 64 K bytes. The memory is divided up as follows (hexadecimal addresses):

0000, 1FFF--8 K bytes user RAM area (program development, work area for test programs, etc.),

2000--16 K byte test program memory (EPROM), 12 K byte RAM area (for RAM test or program development),

9000, EFFF--12 K byte test program, 12 K byte system program (EPROM area),

F000, FFFF--4 K byte system RAM area.

The memory of the control can be broken down into three parts:

--memory area for system programs and system variables,
--memory area for test programs, and
--user RAM area.

We store the tested, good test programs in EPROM's. Ten to sixteen test programs can be put in the EPROM area at one time (using a maximum of 40 K bytes, two EPROM modules) so one can access directly from the system monitor all the test programs for the current product. When testing another product one can access the corresponding test programs by changing the EPROM module.

We realized the programmable switching field of the equipment with i 8255 type PIO circuits. Five PIO modules are connected to the system bus; each of these can handle 72 I/O lines. During a static test we produce the necessary input combinations from a program with the aid of the PIO's; the signals are connected to the inputs of the card to be tested via interfaces dedicated to the several cards. Response signals are sensed in a similar way. During a dynamic functional test the circuit which has been classified as good statically is connected to the system bus of the control with the aid of a multiplexer unit. Thus, for example, the CPU module, the memory and the I/O devices can be checked under real conditions.

If we sense an error during the dynamic test the running of the program can be stopped with the debugger unit connected to the system bus under various triggering conditions; there are possibilities for putting in an outside address and data, stepping the program, continual observation of the address and data lines, etc.

The equipment is placed in a 432 x 270 x 255 mm covered double Europa card case. The panels used are developed on two-sided, fine grained, 100 x 160 mm sheets. The card connectors are 64 or 96 point DIN 41612 gilded indirect inverse system. The back panel wiring is done with wrapping and two-sided, drill metallized NYHL at the conductor. We realized the test interfaces needed for the several card tests on 100 x 190 mm, two-sided sheets. The mechanical development of the test interfaces provides reliable leads and plugs for the clips and card connectors. During testing and the search for faults the circuits being tested can be reached by instruments (oscilloscope, logitester) from both sides.

The equipment can be operated from a 220 V 50 Hz grid. The built-in power unit, which can be plugged in, provides the following direct current voltages:

-5 V 8 A double power unit (control or the module to be measured),
-5 V 100 mA,
+25 V 100 mA, and
-48 V 100 mA.

The 5 V part of the power unit is protected against over-voltage and shortcircuit.

We developed the equipment primarily to test the circuits of the LOTRIMOS system. The circuit appearing in the largest numbers in this system is the Analog Interface (ANI) panel, for which we made an independent test module because of the special test requirements and the large number of units. This test module has 32 analog signal outputs and 16 programmable TTL level I/O channels.

Testing the Z 80 CPU Module on the MICROTEST Equipment
Figure 5 illustrates the structure of the Z 80 CPU modules used in the processor units of the LOTRIMOS operations supervision and maintenance system. The card contains the clock signal circuit, the drivers for the address and data lines and the Z 80 CPU integrated circuit.

We test the module in two steps--a static base test and a dynamic functional check.

During the static base test we connect the circuit to the PIO surface of the MICROTEST through the card connections and with the aid of a test clip located on the socket of the CPU IC (Figure 6). During the test we simulate the operation of the CPU IC and the environment of the module with a series of static states.

Producing the various input signal combinations and receiving the response signals takes place through the programmable parallel interfaces (8255). The measurement consists of the following tests:

--checking power voltage and GND,
--checking the RESET, WAIT, NMI and BUSRQ lines,
--a HALT test*,
--MWR and RFSH test*,
--an IOWR test*, (*with various data and address samples)
--an MRD test*,
--an IORD test*,
--INTA, DES1 and DES2 tests.

During the tests the production of the corresponding input combinations and evaluation of the response signals takes place automatically from a program. The test program can be run in two modes--GO/NO GO and STEP BY STEP.

During the GO/NO GO test the evaluation is automatic; the system grades the card after the running of each test (PASS/FAIL) and returns to the monitor. The test can be repeated; testing a new card can be started by pressing a key. In the STEP BY STEP mode evaluation is again automatic during individual tests. But after the input combinations and response signals appear on the display it is up to the operator whether to repeat the test, return to monitor or start the next test. This mode can be used to check a faulty card; the detailed indicators make it possible for the operator to quickly establish the cause of the error. The indicator image can be seen on the next page.

The test also includes a manual measurement; the phi clock signal must be checked with an oscilloscope. The proper signal form and signal level can be checked visually in seconds, while we could have solved an automatic evaluation only with difficulty. The system starts the next test series only after completion of the manual measurement.

We subject the circuits found good statically to a dynamic functional test. During this the circuit to be tested is connected to the system bus of the MICROTEST control. In this case we control the system with the tested CPU module. With a test program we check the memory write and read, peripheral address and data output and input operations and run various instruction series on the system. In the event of faulty operation we find the cause of the error manually with the debugger unit.

In our experience the fault discovery ratio of the static test is around 90-95 percent. The characteristic card faults generally derive from very simple manufacturing problems:

--the base sheet is faulty (break, short circuit, drill metal missing),
--the soldering is bad (cold soldered, tin bridge, soldering omitted),
--incorrect mounting (reversed position, elements switched, element missing).

The MICROTEST automatic measuring device has proved a very effective tool for quick discovery of errors.

The Indicator Image:

```
***BHG Z-80 MICROTEST***
   Nr. nnnn CPU TEST

GO/NO GO TEST?          (Y)
                        (N)
STEP BY STEP?           (Y)
                        (N)
CPU ADAPTER? (O), K.
IC9 TEST PROM (O), K.
CPU TEST CLIP (O), K.
MEASURE THE CLOCK FREQUENCY!
(CPU PIN 6) 2.5 MHz (O), K.

TEST NUMBER: 08
CPU ADRESS: FFFF      DATA:FF IN
CONN. ADRESS: FFFF    DATA:FF OUT

CPU CONTROL OUT:      1111 1111
CPU CONTROL IN:       1111 1111
CONN. CONTROL OUT:    1111 1111
CONN. CONTROL IN:     1111 1111

CPU CARD O.K.
        ERROR
                continuation of test: (CR)
                in event of error:    (Y)
                monitor call:         (N)
```

4. Testing the ANI Circuits

The circuits appearing in the largest numbers in the LOTRIMOS operations supervision and maintenance system are the ANalog Interface (ANI) modules. This circuit receives the analog signals of the test points of the telephone exchange being studied, digitizes them and passes them on in the form of digital code to the scanner processor. One module is capable of receiving 32 analog signals; the digital data passed on to the processor is in 4 bit form. A block diagram of the circuit can be seen in Figure 7.

During functional checking of the circuit the following tasks must be performed:

--checking power voltages (-48 V, -5 V, +5 V and GND),
--checking card selection or rejection,
--independent operation of every channel,
--testing for "shorts" between channels,
--checking input integrators, and
--checking calibration levels.

Because of the large number of tests and test points observed simultaneously it was useful to automate the test. And only in this way could one guarantee suitable quality and a short test time.

It represented a problem in automatic testing of the card that in addition to TTL level control signals, addresses and data one could find analog signals on the panel. The circuit requires three types of power voltages: +5 V, -5 V and -48 V direct current voltages. The internal power unit of the test device produces these.

Figure 8 illustrates generation of the analog input signals. With the aid of programmable parallel interfaces the desired analog channel addresses and data can be produced and stored in latches. The analog part is connected through an optoconnector to the digital latch and drive stages. HAMLIN HE 721A05-10 miniature card relays connect the analog signals. By pulling the relays (data="0") the test voltage goes to the appropriate analog input of the ANI circuit. When the relay is released (data="1") one can find a -42 V voltage at the inputs of the ANI circuit. The measured values are available at the output of the ANI circuit in the form of digital code, so this can be connected to the parallel inputs of the i 8255 PIO's through the drivers. Generation of the appropriate excitation and reception and evaluation of the response signals can be done automatically with a program.

Naturally the test adapter also contains the relays to connect the power voltages. After the circuit to be tested is plugged in and when the test program is started the connecting of the power voltages takes place automatically also.

The test program, written in Z-80 assembler, can be operated in the following modes: a GO/NO GO test, the STEP BY STEP mode, and in a test cycle.

During the GO/NO GO test the previously described steps of the functional test and the evaluation are executed automatically. Figure 9 illustrates a block diagram of the routine performing the check of channel states. The program first tests the H and L levels on all channels (instructions 1 through 6). Between issuing the excitation and scanning the channel states we use a tau delay (software); the operator can define the value of tau when starting the program (1-15 ms). By changing the delay the program also checks the input integrators. In the event of error all channel states are displayed. The operator can decide whether to continue the test or return to monitor.

Following this the test program studies independent channel operation (instructions 7 through 9). Regularly changing the states of the analog inputs it checks the output of all channels. In the event of error the state of all channels is displayed and the operator can decide whether to continue the test or return to monitor.

In the STEP BY STEP mode the above test is carried out step by step. At the end of every test phase all channel states are displayed and the next test can be started (CR) only by operator intervention. This mode is used to study faulty panels, the faulty channels can be read from the indicator image and one can even make conclusions about the character of the fault (input divider error, address error, calibration error, etc.).

Testing in a cycle aids the search for faults. In this mode the instructions 1 through 4, as in Figure 9, are executed cyclically.

The periodic signals connected to the analog inputs, adressing, calibration and issuing of digital codes can be checked with an oscilloscope. In our experience this mode makes possible a very fast search for faults.

Each year in the course of manufacturing the LOTRIMOS system we have tested several thousand ANI circuits with the above method.

The time of the GO/NO GO test is 1-2 minutes per card; the average testing time including search for faults is 15-20 minutes.

5. Conclusions

We have used the MICROTEST automatic testing device since 1984 to study assembled printed circuits. The equipment works well and reliably; the test results (ratio of discovering faults in individual cards, indicating characteristic technological errors, etc.) are favorable. The on-site assembly and servicing of LOTRIMOS systems manufactured and put into operation thus far and the experiences of users unambiguously prove that with the manufacturing technology used (and outlined above) we have produced high quality, reliably operating equipment. Achieving the high quality level was aided by product design which took into consideration manufacturing and testing aspects, by a correct selection of manufacturing procedures and methods and by (generally automated) testing and checking of every unit as part of every essential phase of manufacture.

Biographic Note

Istvan Regoci graduated from the electronic technology section of the Electrical Engineering School of the Budapest Technical University in 1979. He earned his special engineering degree in 1981. He dealt with microprocessor controlled technological equipment at the university. He has worked as a manufacturing planner at the BHG Communications Engineering Enterprise since 1981. His work area is testing technology for electronic products and within this he deals with testing of printed circuits. He participates in the preparation of special purpose equipment and test programs.

FIGURE CAPTIONS

1. p 499. Structure of the LOTRIMOS subsystem terminal (block diagram).

2. p 499. The LOTRIMOS subsystem terminal (photograph).

3. p 500. Manufacturing technology for LOTRIMOS equipment (flow chart).

4. p 501. Structure of the MICROTEST automatic testing equipment (block diagram).

5. p 502. Block diagram of the CPU module.

6. p 503. Testing a CPU module (photograph).

7. p 504. The ANI circuit (circuit diagram).

8. p 504. Producing analog signals for the ANI test on 8 channels (circuit diagram).

9. p 505. The ANI test program (detail); checking channel states (flow chart).

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DIPEX SOFTWARE SYSTEM

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[Article by Istvan Szeghy, BHG Communications Engineering Enterprise, Developmental Institute: "DIPEX Software System." The first paragraph is the Hungarian language summary.]

[Text] The article describes the software system for the DIPEX telephone branch exchange family. After describing a software model--developed by the designers--the operating system of the DIPEX is described with virtual devices. Examples of realizing the system with an I 8085 processor are given.

Introduction
Imre Horvath, from whom the designation DIPEX (DIgital Private branch EXchange) comes, was the first to publish a comprehensive, detailed system description of the DIPEX telephone branch exchange.

We consider his article as an orientation base for our work (and so recommend it), in which we will describe in more detail the software system for DIPEX, the DIPEX Software System (DPSS).

The DPSS was prepared by engineers and not by computer technology experts so the software model constituting the base of the system reflects the engineering approach in its structure and in its terminology. In developing it, however, many results achieved in regard to computer technology fundamentals were of assistance. (We are thinking here of such models as Agent, Cell and Soma.)

The fundamental ordering and design principle was optimal coupling of the physical operation and the expected and necessary information processes.

On the basis of this principle we defined the several boundary surfaces and system of communication between separate parts, which brought significant other results beyond economical development of a modular program system.

--The modes of realization for the several services can be formulated clearly in the model.

--Building new services into the system is simple.

--Testing of the programs takes place in an easily reviewed environment.

--The DPSS supports the diagnostics of the system at the time of calibration and during operation.

--The always problematic hardware-software cooperation improves; these problems usually derive from the circumstance that the experts do not understand each other's language. The DPSS makes it possible--speaking figuratively--for those standing on opposite sides of the boundary surfaces to see one another and communicate with one another.

The Engineering Software Model

In order to be able to describe the DIPEX software system we must first talk about the model in which we will describe the operation of the system.

We developed a system of devices for our model on the example of representative images--especially useful in electrical engineering practice.

Just as all the essential properties of a device can be described with a representative image so the constructs of our software model symbolize operations of a program without our knowing anything about the details of the object program running in the computer.

The devices of our software model are made up of the following elements:

the SDLCP (SDL Central Processor),
the VPU (Virtual processor, the only function of which is execution of an operation according to the specifications of the model),
the RAM (writable-readable memory), and
the VIO (virtual input/output devices).

Use of our model is independent of machine and program language.

Let us list the basic constructs of the engineering software model!

1. Software Signals

These are the basic elemer .s of the communication among thedevices of the model--to be described below--which the virtual input/output (VIO) elements receive or send.

A programming technique example of this is as follows. Two programs are running in the system. The second wants to use the result of the first as data. We call this data or parameter a software signal. The two programs can be running sequentially or concurrently!

2. Devices Which Can Be Described With a Flowchart

These model p.ograms the operation of which is continuous, in contract to the programs described under point 2 [as published; "point 3" apparently intended] whose operation is interrupted by waiting states.

2.1. The Software Machine

This is made up of a VPU and RAM. The different machines have different VPU and RAM. The software machine carries out its task on the basis of data found in its own RAM. An example is the execution of ringing. When a flag enables operation of the machine it reads out in turn the codes of the extensions in its RAM and activates their ring relays.

2.2. Software Interface

It consists of a VPU and RAM. Its task is temporary storage of software signals, passing them on and activating the SDL devices of the model.

3. Devices Which Can Be Described in SDL

Instead of describing SDL we refer to the literature (Istvan Szeghy, "An SDL Processor," HIRADASTECHNIKA, 1984, No 6, and CCITT Recommendations, Yellow Book, Vol VI/7). By a device which can be described in SDL we mean programs operating periodically, which go into a waiting state after execution of a definite series of operations, and then continue running as the result of some signal.

Naturally to achieve program running of this sort one needs a CPU with a defined operating system. We used as a building element in our model the SDLCP abstract central processor, which has the property of being suitable for such periodic program execution.

3.1 The SDL Automat

This is a device with virtual input/output (VIO) and an SDLCP; its characteristic is that it issues only software signals as output. It does not have its own memory.

We use it in the system for hardware coupling; the preprocessing of hardware signals takes place with its aid.

It is activated from the waiting state as the result of a defined input signal. It then executes the programmed operations for the input which has arrived, and then goes into a waiting state.

It issues specific output signals as a result of certain inputs and programs.

The DPSS uses this device to solve, for example, the receipt of digits. The digit SDL automat processes the state change signals coming from the hardware and the timing signals of the internal clocks to produce the following outgoing signals in coded form:

--number arrived,
--extension put down,
--time exceeded,
--grounding button operated,
--non-numerical information received.

An SDL automat is always hardware specific, but its outgoing signal is independent of the hardware. So it makes no difference whether the number information is sent with DC pulses by a dial extension or by MFC; if the proper SDL automat is connected the necessary information is processed and sent on in a uniform form.

So its use is outstandingly suitable for dynamic reconfiguration of a system.

3.2 The SDL Processor
This has virtual input/output (VIO), an SDL central unit (SDLCP) and its own writable-readable memory (RAM).

With its input device it receives both hardware and software signals; as output it produces hardware control signals and software signals.

In order to operate it generally connects to itself an SDL automat suitable for the current task.

This means that the connected SDL automat uses the memory area of the SDL processor and its output device issues its signals exclusively to the SDL processor.

The SDL processors are capable of communicating with one another through their VID's [as published; "VIO" apparently intended] with software signals transmitted either directly or indirectly, on an appropriate software interface (see Figure 1).

The Finite Message Machine (FMM) virtual device described in the references [R. Arranz, R. Conroy and L. Katzchner, "Structure of the Software for a Switching System with Distributed Control," SESSION 41 A Paper 3, ISS '81 CIC, Montreal, 21-25 Sep 81] is similar to our design.

Realizing the Engineering Software Model
We realized the model described above in the DIPEX branch exchange family on an I 8085 microprocessor.

The programming of the devices which can be described with a flowchart was done in INTEL assembly; we developed a special language to program the devices which can be described in SDL. An earlier article [Istvan Szeghy, "An SDL Processor," HIRADASTECHNIKA, No 6, 1984] describes the basic concept and design of this language. Since that article appeared the language has been expanded with additional instructions which support the communication of the SDL processors with one another.

The Operating System for the DIPEX
Figure 2 shows the structure and operation of the operating system.

The operating system has a cyclic structure. The loops which can be seen in the figure--these loops tie together the software model devices--represent these cycles.

The devices tied to the basic cycle are activated every 10 ms unconditionally in the order seen on the loop.

We call this the heartbeat of the exchange. (The lighting of an LED on the CPU card indicates its flawless repetition.)

The other cycles are activated as a result of definite hardware changes.

The cycles are started by various level (priority) interrupts. The priority relationships of the cycles can be seen from the figure. (The higher priority cycle "overlays" the lower priority one.)

It can be easily seen that an interrupt cannot affect the first section of the basic cycle. In this section the internal timing machines, the machines generating tone signals, the operator and general software interfaces and the machine generating the new SDL processors are activated.

In the next section of the basic cycle run those programs which require longer running time but which can be stopped by an interrupt. Two different program loops are activated in this section by turns--one in the even cycles and the other in the odd. The one contains the long time programs connected with call processing (LED signals, main line dialing out, software machines handling hanging up administration). The other contains real-time diagnostic programs.

In connection with this latter we would like to point out how effective the simplest solutions can sometimes be. At the time of developing the system and testing the first real-time programs we ran a simple dump program in this cycle with which we wrote out a memory field which could be sent arbitrarily to display. With this we opened a window on the living exchange where we could study the exchange in vivo. This method was especially advantageous in contrast to the traditional trace procedures because we could observe a number of memory bytes at once and so could simply set off combined multiple errors.

The scanner cycle consists of a single device which we called a VIO in our model. Its task is to write into the general software interface memory the signals arriving from the scanner circuit which were generated as a result of hardware state changes.

The operator VIO placed at the other interrupt level has a similar function. This hands on to the operator software interface the signals coming from the operator set.

These two loops or VIO's realize the hardware-software boundary surface on the input side.

One immediately sees from this one of the basic principles of the DPSS according to which the receipt of arriving signals and the processing of them are separated in time. (The processing of the signals passed on by the VIO's continues in the software interfaces when they are activated in the main cycle.)

The most important task of the basic cycle of the DPSS is to activate the operator processors and the general SDL processors through the software interface.

(Most of the latter are involved in call processing, but there can also be special purpose SDL processors in the system--for diagnostics, time measurement, etc.)

In the figure one SDL processor is connected to the operator software interface and several SDL processors are connected to the general software interface. This method of portrayal is intended to illustrate that these devices operate in a concurrent mode, about at the same time. In reality the system is such that individual SDL processors are generally in a waiting, inactive state and are activated only if the software interface so instructs them. This happens when a software signal arrives for an SDL processor, as a result of a hardware change or timing, possibly from another SDL processor. Naturally the software interface is in serial operation, but the processing taking place at the microlevel appears simultaneous at the macrolevel.

A person using the telephone branch exchange will feel as if the exchange were involved only with his call, dealing only with him. This circumstance greatly simplifies the task for the designer of the software.

During the designing it is sufficient to work out the processing programs for only one call; the operating system will take care of the "multiplication"!

In the DPSS doing the work in this form has another advantage too. Namely it reduces the operational times, because it deals with the individual calls only if this is needed. We might say that the information processing and consuming telephone branch exchange is trying to optimally close out the information generator in the external world.

The last uninterruptable machine working in the main cycle belongs to this theme; it generates new SDL processors.

Its task is to introduce a new SDL processor into the system at the initiative of an extension. When to permit and when to reject this depends on the algorithm of the program of the machine. If this algorithm has feedback dependent on a certain traffic load the earlier information coupling may improve further, but in any case there is protection against an overload.

Examples of Realizing DPSS in Telephone Branch Exchanges

We realize the virtual processor (VPU) figuring in the engineering software model in the single processor system of the DIPEX by having the operating system "loan" the CPU of the exchange to the several model devices for the time of their operation. Thus the VPU's of the devices figuring in the DPSS are identical with the common hardware control processor. This is possible because of the serial character of the operations.

The DPSS is basically SDL processor centric. Every communication action in the system is connected to this abstract device. There are:

1. Call Oriented SDL Processcrs
These are generated in the course of the operation of the exchange for each independent, internal process (e.g., a call). Their memory size and their organization are determined; their location in memory changes dynamically (where there is room!). They cease to exist when the process represented by them ceases (e.g., when both parties hang up in the in-house conversation state).

2. Terminal Oriented SDL Processors
These image by their operation the behavior of the terminal for which they were generated. They can be:

2.1. permanently assigned to a definite terminal. The operator and main line SDL processors are of this type. These are created when the system is generated; the memory address and size of each of them is permanent and they do not cease to exist.

2.2. assigned dynamically to individual terminals. These are generated as needed, they exist in the system as long as they are needed, then they cease to exist. Their memory organization and size are permanent but their location in memory (memory address) changes dynamically. The operation of the other hardware processor systems can be described with this sort of SDL processor!

Example of the Operation of a Call Oriented SDL Processor
We chose the call oriented SDL processor organizational mode in those DIFIX branch exchanges where a simpler service assortment had to be realized.

As an example we will briefly describe how an extension makes an in-house conversation contact in this system.

1. When our extension picks up the handset the scanner circuit detects a b-branch change and reports to the operating system with an interrupt. When the interrupt is received the scanner software machine writes the terminal data (the serial number of the terminal and the code describing the logical state of the terminal) for the call initiating extension into the memory of the general software interface.

2. When it starts to process the code coming from our extension the general software interface establishes that a previously free, inactive terminal has been activated and so it requests the generation of a new SDL processor from the software machine whose task this is.

3. If the necessary conditions are fulfilled the SDL processor generating machine creates a new SDL processor.

It turns on a digit receiving SDL automat.

It puts the SDL processor itself into the basic state for digit reception and then it takes care of timing and other administrative tasks. It creates a virtual output for our extension which hands on to the input of the connected SDL automat the signals being created at the terminal.

After this, we say that the SDL processor assigned to the call has brought our extension into its sphere as a caller.

The dial tone is turned on for the calling extension. The new SDL processor goes into a waiting state and returns control to the general software interface.

4. After our extension has dialed the number of the extension being called the SDL processor which is in the digit reception state sees if the extension being called is free. If it is free it disconnects its previous SDL automat and connects a ringing automat to itself. At the same time it creates a virtual input in the direction of the called terminal through which it will be able to sense its response.

5. After the called extension responds and a voice path has been connected between the two extensions (that is, there was a free time slot pair), the SDL processor assigned to the call:

--connects to itself a conversation watching SDL automat,
--creates a virtual output for the extension called (through which it can pass on its terminal behavior to the connected SDL automat),
we now say that the call processor has brought the called extension into its sphere,
--and it assumes the "extension-extension conversation" state.

6. The voice contact ends if one party hangs up. The conversation watching SDL automat senses the break through its virtual input. It sends a software signal concerning this to the SDL processor, which performs the necessary operations (disconnecting the voice path, freeing the time slot and removing the virtual output device from the terminal of the extension which hung up).

Now the call SDL processor brings into its sphere the extension which has left the voice contact open and turns on a busy signal for it.

A new SDL automat is activated (the general observation automat) and the SDL processor itself goes into the "busy signal" state.

7. After the second party has also hung up (the one who got the busy signal) the break contact process begins.

This involves disconnecting the busy signal, removing the virtual output at the terminal and abolishing the call SDL processor.

Example of Operation of a Terminal Oriented SDL Processor
If it becomes necessary to realize services in which the activity of more than two participants must be coordinated (e.g., a call transfer in which all three participants could hang up, conference calls, etc.) then the call oriented SDL processor solution becomes inconvenient, difficult to review and in some cases impossible--because of locating and managing the various virtual points.

Going beyond its graphic quality the strength of the terminal oriented SDL processor model lies in the fact that it has in it implicitly the possibility of designing realization of several different hardware processors operating concurrently.

The newest version of the program language we developed to program SDL model devices has constructs which support such an operational mode. One of these is the syntax instruction SEND (code) TO (address) with which one device can send software code to another. (The "address" represents an interface device, defined by the user, realized by software means, by a program.)

There is also software input management realized by the syntax instruction

Procedure input do
IF (code) THEN (action) ELSE input end.

As an example we describe the handling of a call transfer in which all three participants have their own SDL processor and all three are capable of actions independent of the others.

(In general under domestic conditions the main exchange cannot break out of the extension-main line conversation state. The main line in our example is able to break the connection!)

Let us look at the situation where the extension identified as B is waiting while the extension identified as A is talking with the main line identified as FV. We will detail two actions:

1. The waiting B extension hangs up. (Our example describes the software message transfers.)

As is well known the criterion for hanging up is that the b-branch change resulting in a logical state corresponding to the rest (free) state of the terminal should not be followed--for a determined time--by another b-branch change.

It appears from this that evaluation of a hang-up is a complex process.

The SDL processor of the B extension carries out this process in a sovereign manner and as a result it breaks--abolishes--itself, thus freeing the terminal of the B extension.

Before starting the break process it sends a code to the SDL processor of the A extension with which it informs it that it has broken off. The SDL processor of the A extension changes its previous transfer call conversation state to the normal conversation state and sends a code to the main line SDL processor that in the conversation state between the two of them there is no longer a third waiting!

2. The A extension hangs up. (Our example describes the sovereign behavior of the SDL processors.)

The SDL processor of the A extension establishes that the extension has broken off and sends a code to its conversation partner--the main line--that it has hung up.

As a result of this code the SDL processor of the main line executes a legality test to see if the B extension is entitled to a main line connection. (We transfer the data automatically with the code.) If so it switches itself to conversation mode in the direction of the B extension and returns a code to the SDL processor of A as a result of which it sends a code to the SDL processor of the waiting B and then breaks off. The waiting B is activated and a conversation state comes into being between the main line and the B extension.

We feel that it is a trivial solution for the SDL processor which gives the instruction for direct hardware intervention to be always the one which directly senses the hardware change! To conduct some analyses (e.g. an entitlement determination) the situation is not so unambiguous.

In our example we determined main line entitlement with the SDL processor of the main line and not with that of the extension, the idea being that the device should do the analysis the operation of which depends on the result of the analysis.

In a situation where three extensions are involved in the call transfer and the waiting extension hangs up there is no need for an entitlement analysis for a conversation state to come into being between the two extensions.

Biographic Note
Istvan Szeghy completed his studies at the Budapest Technical University where he received his weak current electrical engineering degree in 1954. Between 1954 and 1958 he was a factory engineer at the Electronic Measurement Instruments Factory (EMG). After 1958 he worked as development engineer at the Electromechanical Enterprise (EMV), later as laboratory chief dealing with development of communications radio transmitters. At present he is chief of a laboratory at the BHG Developmental Institute (the legal successor to the EMV) where they develop software for a digital telephone branch exchange family.

FIGURE CAPTIONS

1. p 507. Communication of SDL processors with one another.

2. p 508. Operating system for the DIPEX.

8984
CSO: 5500/3013

BRIEFS

NEW RADIO, TV SITE--Boradcasting Corporation of the Bahamas officials were in Grand Bahamas this past weekend as land was cleared and a sign erected at the site of what will be the new facilities for ZNS 3 Radio and a proposed TV station in the north. The chairman of the corporation, Holy Cross MP Mr Charles Carter, says that the time is right. [Excerpt] [Nassau Domestic Service in English 1700 GMT 7 Apr 87 FL] /12232

CSO: 5540/084

OPERATIONS OF STATE-OWNED BROADCASTING CORPORATION EYED

Discussion in Parliament

Bridgetown DAILY NATION in English 19 Mar 87 p 24

[Article by Hartley Henry]

[Text]

THE state-owned Caribbean Broadcasting Corporation (CBC) came in for a tongue-lashing yesterday, with Parliamentarians on both sides of the House voicing disgust at its operations over the past ten years.

Prime Minister Errol Barrow spearheaded the attack, and accused some staff members of "loitering on the corporation's premises".

Barrow, who has recently assumed ministerial responsibility for the corporation, said he was baffled over the increase in the staff from 34 in 1963 to 205 in 1987.

He also charged CBC was now seen by some employees as "a form of outdoor relief" and hinted that a staff shake-up might not be far off.

The Prime Minister said he did not expect a significant improvement in CBC's finances this year, because not only was it over-staffed, but competition for the advertising dollar was stiff.

He pointed out that business houses normally allotted a set amount of money to advertising and this had to be spent with those sections of the media which enjoyed most public support and which would give maximum returns.

According to the Prime Minister, while CBC had a monopoly with television advertising, it had to struggle under intense pressure from the privately-owned Voice of Barbados.

As far as satellite television was concerned, Barrow said he had directed the chairman of CBC to take a hard and careful look at this system to ensure its viability.

He also made it clear that the present Government was not necessarily committed to implementing STV in its proposed form.

Opposition MP, David Simmons, agreed with the Prime Minister that over-staffing was one of the biggest problems facing the corporation.

He explained that while the number of managers increased, the quality of management decreased; and this resulted in the radio section having to "reel under the innovative and progressive VOB".

Simmons, himself a former chairman of CBC, said the corporation made a profit in 1979, but a "bad" decision by the administrators who succeeded him dashed all hopes of further prosperity.

He said it was wrong to split the radio and television departments, as this resulted in duplication in many areas and the creation of a number of managers who were not trained or qualified for their jobs.

Government backbencher, Leroy Trotman, said CBC had been paying top heavy salaries. He said the reporters and announcers who did the bulk of the work were underpaid.

Borrowing Approval

Bridgetown DAILY NATION in English 19 Mar 87 p 12

[Text]

THE CARIBBEAN BROADCASTING CORPORATION (CBC) has been given the nod to borrow $22 million needed for its capitalisation programme.

The money was agreed to by the Ministry of Finance, according to Minister of Tourism and Industry, Branford Taitt.

He made this disclosure yesterday in the House of Assembly during as debate on Government's 1987 Estimates of Revenue and Expenditure continued in that Chamber.

He said that CBC, by its virtue to borrow money was given the go-ahead to use the approved sum for improving their status.

Taitt explained that when the he assumed responsibility for the corporation there was a plan to borrow money from the Euro-dollar market, but a decision to halt this saved the CBC $3 million.

He said he could not find the rationale behind the plan to borrow the sum of money.

The former Minister of Information told the House there are arrangements made for the CBC to get whatever money it needs through loans from the local bank where the corporation has its account.

He emphasised it was the minister and not the board that stopped the transactions at the state-owned television station.

Taitt said he was asked to approve $950 000 for equipment he later realised was "lying in the Port" already paid for. He called the halt, he said, so that the slate could be wiped clean and a new side started on.

The minister further stated that plans for constructing the new building for the CBC only to discover that the proposed studio was inadequate for the operations of the station. He charged that $6 million would have been spent to construct the building.

Taitt said $22 million was a substantial sum of money and any new board has a responsibility to be completely aufait with how and where the money was being spent.

While admitting there were problems at the CBC, Taitt said it would be unfair to describe anyone there as "inept". He explained that when the contract of the last general manager ended, the board came to a decision not to renew it and the minister agreed.

/9317
CSO: 5540/085

NATION IS FIRST TO HAVE 'FULLY DIGITAL' PHONE NETWORK

Roseau THE NEW CHRONICLE in English 6 Mar 87 p 1

[Article by Anthony Andre]

[Text]

Dominica is now the only country in the world to have a fully operational digital telephone network serving the entire nation with the latest in telephone technology. As of February 27 Dominica left developed countries like Britain, Japan and the United States behind in this technology.

Cable and Wireless the island's only telephone company has spent a total of EC $30 million dollars on the digital project and its computerised equipment. Also involved in the project was the erection of micro-wave dishes in Roseau, Portsmouth and the Carib Territory as well as the laying of over 50 miles of underground cables which, according to company officials are for security and safety purposes.

The digital project which featured IDD was completed in three phases but over all completion of the project is carded for April.

In switching to the digital system, Cable and Wireless have thrown out their old analogue equipment which had served them for over 20 years but which is still currently being used in the Caribbean and other developed countries of the world.

According to officials at the telephone company the new system takes sounds made by the telephone users and transfers them into billions of bits of information via computer and is decoded by computer thus ensuring a faster, more dependable and higher quality transmission and a clearer service and is based on the same principle as the latest audio sound equipment.

With the arrival of the new equipment Canadian technicians from Northern Telecom were called in to install the equipment they manufactured which upon total completion of the project will be operated by fully trained Dominican Cable and Wireless staff.

The Digital system ensures the expansion of the system to accomodate more lines and is expected to last well into the 21st Century.

/9317
CSO: 5540/087

JAMINTEL RECORDS RECORD PROFIT FOR '84--85 FISCAL YEAR

Kingston THE DAILY GLEANER in English 27 Mar 87 The Financial Gleaner p 1

[Text]

JAMAICA International Telecommunications Limited made a record net profit of $33.9 million in the 1984-85 financial year, according to Ministry Paper No. 16 tabled in the House of Representatives on Tuesday.

Total revenue for the year increased by 26 per cent to $98.82 million, reflecting "the substantial increase in the Jamaican currency equivalent of the company's foreign exchange holdings due to the devaluation of the Jamaican dollar".

According to the Ministry Paper, there was a 25 per cent increase in operating expenses over the 1983-84 figure.

"This was due to increase in cost of those items of expenditure carrying a high foreign-exchange content, e.g. cable systems maintenance, tele-communication equipment maintenance, electricity —and resulted from the devaluation of the Jamaican dollar".

There was a marginal decrease in the volume of telephone traffic from 71.7 million paid minutes in 1983-84 to 71.1 million paid minutes in 1984-85. "This was attributed to the 100 per cent increase in rates on outgoing traffic which came into effect on July 1, 1984.

"The total number of international telephone circuits in use was 448 as against 446 in 1983-84".

MORE TELEX USE

There was an overall 14.3 per cent increase in the use of telex services in 1984-85, due largely to a substantial increase in incoming traffic. But the use of the cablegram service continued to decline gradually while remaining the most accessible means of overseas communication for the rural areas.

"Jamintel continued its Capital Development Programme which commenced in 1982, in an effort to provide Jamaica with efficient and economical telecommunications services".

During the year, the Stored Programme Controlled International Telephone exchange, costing some $8 million was brought into service. It meant an additional 1,550 lines, enabling the company to meet increase traffic demands and improve service to the public.

Planning also continued for the new Trans-Caribbean Cable System which will link Jamaica, the United States, Haiti, Colombia and the Dominican Republic. Work on the two floors which were added to the Jamintel Centre has been completed and plans are going ahead for the new office building, the Ministry Paper said.

/9317
CSO: 5540/088

BRIEFS

NEW PROVINCIAL TV STATION--The Konarha Province local television station was inaugurated at a ceremony yesterday and commenced broadcasting. The ceremony was attended by various party and government officials. Comrade Niaz Mohammad Mohmand, secretary of the PDPA Central Committee spoke about the cultural policy of the party and government for the improvement of Mass-media activities and the role of television in enlightening the public mind as well as its educational importance. A relevant source in Asadabad said that the local Konarha Province station operates on the SECAM system and broadcasts 2 hours daily from 1800 to 2000. [Excerpt] [Kabul Domestic Service in Pashto 1530 GMT 27 Mar 87 LD] /12624

KABUL TELEPHONE SYSTEM EXPANDED--In order to welcome the 9th Anniversary of the April Revolution, the extension of the automatic telephone system in Shershah Mena (Kabul) with a capacity of 2,000 lines was opened today by Comrade Mohammad Aslam Watanjar, member of the Politburo of the PDPA Central Committee and minister of communication. At the opening ceremony the communication minister said that since 1983 8,800 telephone lines have been opened and commissioned in various parts of Kabul. [Excerpt] [Kabul Domestic Service in Dari 1600 GMT 12 Apr 87 LD] /12624

CSO: 5500/4711

BRIEFS

AXE PHONE EXCHANGES FROM ERICSSON--Ericsson has now received a commission from the Algerian Telecommunications Ministry to expand telecommunications in Algeria by adding AXE switching equipment. The contract initially will give Ericsson approximately 400 million kronor, and the door remains open for Ericsson to undertake other projects in Algeria in the future. The news of this contract contributed to increased interest in Ericsson share on the Stockholm Stock Exchange. This latest agreement from Algeria has been expected since last summer. [Excerpts] [Stockholm SVENSKA DAGBLADET in Swedish 25 Mar 87 P II] /12232

CSO: 5500/2488

BRIEFS

MEMORANDUM ON BROADCASTING--New Delhi, March 14: A memorandum of understanding between India and the Asia-Pacific Institute for Broadcasting Development (AIBD) for setting up a development broadcasting unit (DBU) in collaboration with the Canadian International Development Agency (CIDA) and Ryerson International Development Centre (RIDC) was signed here. Mr R.C. Sinha, joint secretary, ministry of information and broadcasting, signed the document for the government of India on behalf of All India Radio and Doordarshan, while Mr Dato Abdullah Mohamad, director, AIBD, signed the memorandum on behalf of the CIDA and RIDC. The DBU project aims at sensitising the population of the four eligible selected Asia-Pacific countries towards a programme of understanding of development issues. The project will focus on three major issues: the role of women in development, human settlements and urbanisation and environmental considerations in economic development. The project will help in the training of teams of broadcasters and allied personnel. [Text] [New Delhi PATRIOT in English] [15 Mar 87 p 5]

TELETRUST OF INDIA--The TV Programme Producers Guild of India has decided to launch "Teletrust of India", a national TV news agency to provide Doordarshan with daily video news clips from all over India and abroad, reports UNI on Sunday. The guild has been providing Doordarshan with spot news as also news features from all over India for the past 18 months. The new TTI is expected to further expand the news gathering operations for TV. The ownership of the Teletrust, a no-profit no-loss organisation, will be limited to the members of the guild. In a press note issued today, the guild said Teletrust will bring the latest news via the fastest means to the TV viewers in India. It was due to the efforts of the guild that colour TV came to India and again at its initiative sponsored programmes were accepted by the Government, the press note said. The national executive of the guild which is now meeting in Madras has expressed the hope that Teletrust will also engage in some other programmes related to matters of information. [Text] [New Delhi PATRIOT in English] [16 Mar 87 p 5]

HIMACHAL PRADESH TRANSMITTER--March 14--A low power TV transmitter, the fourth in Himachal Pradesh, was inaugurated at Mandi today. With this nearly 60 per cent population can now enjoy telecast from Delhi and Jalandhar Doordarshans, report agencies. Presiding over the function, Chief Minister Vir Bhadra Singh disclosed that a mother TV station with facilities for production of programmes would be installed at Shimla together with a one kilowatt transmitter during the next three years. [Text] [New Delhi PATRIOT in English] [15 Mar 87 p 6]

TELEVISION RELAY STATIONS--The Centre plans to set up television relay stations at towns which had more than one lakh population, Union Minister of State for Finance Janardhana Poojary said today. Speaking at the inaugural function of a television relay station at Udupi, near Manipal, the 14th in Karnataka, he said two more high power transmission centres would be set up at Dharwad and Shimoga in the State during the seventh Plan. With the commissioning of today's transmitter 66 per cent of the State's population was covered under television network. [Text] [New Delhi PATRIOT in English] [15 Mar 87 p 6]

SATELLITE LAUNCHING PLANS--NEW DELHI, March 5--France will launch the second Indian communication satellite aboard the Ariane rocket this year, report UNI and PTI. This was agreed at the official Indo-French talks lasting two-and-a-half hours between the External Affairs Minister, Mr N. D. Tiwari, and his French counterpart, Mr Jean-Bernard Raimond. The satellite will be launched from the territory of French Guinea. The first Ariane satellite sent up for India a few years ago was not successful. India, at an official dinner for visiting French Foreign Minister today reiterated the call for world leaders to start the process towards universal nuclear disarmament. "Disarmament, particularly nuclear disarmament, is a pre-requisite for peace", stressed Mr Narayan Datt Tiwari, without making a reference on this occasion to France's nuclear tests in the South Pacific. Mr Raimond, in the first high-level visit to India and later Japan since the right-wing Government of Mr Jacques Chirac came to power in France a year ago, called on the Prime Minister soon after arriving here early today. The 25-minute call on Mr Gandhi was followed by talks by the two Foreign Ministers. Mr Raimond made a reference at the dinner to France's initiative to focus attention on the inter-relationship between disarmament and development. [Text] [Calcutta THE STATESMAN in English] [6 Mar 87 p 9] /12379

CSO: 5550/0112

SUPARCO COMPLETES STUDY ON SATELLITE PROJECT

Islamabad THE MUSLIM in English 6 Apr 87 p 8

[Text]

KARACHI, April 5: A feasibility study on the domestic satellite communication system for Pakistan in collaboration with a renowned organisation of the United States has been completed by Pakistan Space and Upper Atmosphere Research commission (SUPARCO), it is learnt.

Recommendations based on the feasibility study and comments of the experts of the potential user agencies will now be placed before the Federal Cabinet for a final decision on the project.

The study includes discussion on items such as analysis of needs, system definition/specifications, regulatory aspects, system development schedule, budgetary cost, training of manpower and economic feasibility of the satellite project.

The study has been examined by experts of (SUPARCO) as well as those of the potential user agencies like the T and T department, Pakistan Television Corporation and Pakistan Broadcasting Corporation.

Concurrent with this effort, application for reservation of two slots, one at 38 degrees and the other at 41 degrees, in geostationary orbit for the (PAKSAT I and II) has been approved by the International Frequency Registration Board of the International Telecommunication Union (ITU). The frequency spectrum for communication purposes will be in 14000/11000 megahertz band.

SUPARCO has also successfully developed television receive only (TVRO) terminals and related microwave subassemblies and components to enable direct reception of television signals from direct broadcasting satellites in preparation for use of this spin off development of space technology in bringing about nationwide communications and reception of television programmes.

An agreement for reception of picture information from the US LANDSAT satellite has been already signed between SUPARCO and the US National Oceanic and Atmospheric Administration (US NOAA) and discussions are now in an advanced stage for signing of an agreement with spot-image of France for reception of data from the projected French spot satellite.

SUPARCO is already establishing a satellite ground receiving station expected to cost Rs. 230 million for direct reception of picture information at Islamabad, from the US LANDSAT satellite as well as from the projected French spot satellite.

The station will also be able to receive pictures of cloud cover from meteorological satellites—an information highly relevant for the purpose of accurate weather forecasting over large areas.

New facilities are also being established for quick and precise analysis of satellite remote sensing data. These facilities will use high speed digital computers for this work.

Meanwhile SUPARCO has also prepared a plan for an aerospace institute to train high level manpower in various specialised disciplines of space science and space technology under the directive of the government.

The proposed institute will conduct both short-term and long-term specialised courses. The long term courses would lead to the award of post-graduate degrees in space science or space technology. The institute would not only meet the increasing demands of manpower for implementation of long term programme of the commission but also those of other organisations who are engaged in aerospace related high technology fields.—PPI

/12828
CSO: 5500/4712

CABLE LINK PLANNED BETWEEN GUINEA, IVORY COAST

Abidjan FRATERNITE MATIN in French 6 Mar 87 p 1

[Article by Raphael N'Guessan]

[Text] Telecommunications between our country and Guinea will experience further development in the years ahead. The two countries have in fact joined together in the capital to sign an agreement protocol for the laying of an underwater cable linking Abidjan with Dakar via Conakry. As Vincent Tieko Djedje, minister of posts and telecommunications, explained in a statement made in his office on Tuesday, the cable will be like the one already laid between Abidjan and Dakar and should result in better handling of traffic from our country to Conakry and Dakar.

Two more countries, Liberia and Gambia, are also interested in the project and co-signed the Conakry agreement protocol. The cost of the project is an estimated 10 billion francs and is to be equally financed by the five nations participating in the undertaking. Work is not to begin for 3 years, the time it will take to complete feasibility studies and calls for bids. In the opinion of the postal and telecommunications minister, there is no urgent need to lay the second cable. The existing cable is reaching the saturation level, but it will be adequate to meet needs during the next 3 years. "Our concern is to build up the existing equipment so that at the end of 3 years, we can have very reliable communications enabling our countries to have closer contact, correspond better and provide better support for economic activities."

Then what is the reason for the underwater cables in an era of satellites? "Satellites appeared a little later than the underwater cables, but we are also in an age of improved underwater cables. Previously, underwater cables could handle only telegraph traffic, but today's cables can also carry telephone, telex and telegraph traffic."

However, it was out of a concern for diversification that our nations agreed to use the technique of underwater cables, which are constantly evolving and improving. "We can use the satellite with the Akakro station," the minister explained, "and we believe that based on a concern for diversifying our means, we should also have other facilities. That is why we opted for the underwater cables and even microwave systems. In that way, if the Akakro station should experience any operating difficulties, we could still communicate with the outside." Better safe than sorry!

11,464
CSO: 3500/38

FUND SHORTAGES LEAD TO FRCN PROGRAM CUTS

Kaduna NEW NIGERIAN in English 12 Mar 87 p 9

[Article by Su Waid Isah]

[Text] THE Major problem which the Federal Radio Corporation of Nigeria (FRCN) Kaduna faced in its 25 years of existence was shortage of funds.

Since 1983 the station has been forced to shelve some of its development programmes.

Disclosing this to the *New Nigerian* yesterday while speaking on preparations for the 25 years anniversary of the station, the Zonal Director of the FRCN Kaduna, Malam Mohammed Ibrahim said the financial problem has also affected manpower training programme for staff of the station. Some professional commitments of the station have also been reduced, he added.

The zonal director expressed optimism that the financial situation could improve if the federal government allowed commercial broadcasting on the FRCN which would not only generate internal revenue for the stations but also relieve government of some of its financial commitments.

Malam Mohammed Ibrahim suggested that if government could not allow commercial broadcasting on the FRCN stations then it should allow the stations to establish some channels of public services and some for commercial broadcast as obtains in UK and Sri Lanka.

Recalling the role of the former Broadcasting Corporation of Northern Nigeria (BCNN) during the 1966 civil war and aftermath, Malam Mohammed Ibrahim said the station was in the fore front in propagating to the grassroot the need for reconciliation.

He said during the civil war, the station was "cautious not to inflame the already tense situation" but rather to play "a low key role," adding that the role played by broadcasters of the station during the period was professionally the best given the circumstances.

Commenting on the editorial policy of the station, the zonal director remarked that what was paramount to the station was to serve the northern view within the context of national interest. He reiterated that the station put "reason, fair comments and public interest" above anything while serving its northern audience within the wider national context.

He said the people accusing the station of being northern oriented failed to realise that all stations under the FRCN as they were zoned have catchment areas to serve; adding that since the station was in north it would continue to champion the northern audience whom it was licensed to serve.

He said the credibility, trust and acceptance which the station enjoyed over the years was immeasurable. He attributed this to the editorial freedom and policy which the station has, adding that the station enjoyed public confidence because of its truthful, accurate and factual reporting.

He said it was because of this that the station has not had any legal tussle in all the 25 years of its existance.

/12828
CSO: 5500/45

DISSEMINATORS OF 'BLACK PROPAGANDA'

Moscow INTERNATIONAL AFFAIRS in English No 2, Feb 87 pp 110-118

[Article by Dmitri Biryukov]

[Text]

TRACING THE LINEAGE

It stands to reason that the origins of the subversive outfit, Radio Liberty and Radio Free Europe, should be traced back to the announcement in *The New York Times* which said that a group of citizens, in full observance of the laws of the State of New York had formed a "National Committee for a Free Europe", whose structure was to include a radio station Free Europe. This happened in the summer of 1949. However, something is missing in this chronology, for the idea of such radio stations had emerged not in America but in Germany in the 1930s.

Any self-respecting Western publication put out in the postwar decades dealing with psychological warfare includes a section on the principles and practices of nazi propaganda. It is often noted that it was the Third Reich's propaganda ministry that pioneered the use of broadcasting for subversive propaganda. It was on Goebbels' orders that subversive radio stations were set up to beam their broadcasts to specific regions and countries. They were shamelessly disguised as national stations, such as L'Humanité, Concordia and For Russia.

Reviewing the work of Liberty and Free Europe radio stations over the past decades one can see that they have fully assimilated the legacy of nazi subversive propaganda and have gone even further. Irrefutable data has been published more than once proving that both radio stations are carrying out intelligence as well as propaganda functions. Fresh evidence of this keeps appearing. In spite of the secrecy surrounding the activity of the RL/RFE, it forms the subject of dozens of books and articles.

However, some of these useful and interesting studies are marked by certain complacency. The argument runs along the following lines: since it has been proved that the RL/RFE are instruments of the US Central Intelligence Agency and their methods have been discredited in the eyes of public opinion they do not merit much attention. Some authors take a lighthearted view of the task of exposing these radio stations dismissing them as "primitive tools of slander and disinformation" whose place is in history's dustbin.

Things are not as simple as that. Today the RL/RFE, while still relying heavily on lies and misinformation, are introducing more sophisticated methods. With the principle of openness establishing itself more and more in the socialist countries, Liberty and Free Europe are likely to try to adjust themselves to these new conditions. It is therefore necessary to continue to expose every aspect of these organisations' activity.

Liberty and Free Europe are broadcasting in 22 languages spoken by the peoples of the USSR and East-European socialist countries. Programmes are beamed to the Soviet Union round the clock 500 hours a week. The recently appointed chairman of the joint management of Liberty and Free Europe is Eugene Pell, former director of the Voice of America. Nicholas Vaslef, a regular US Air Force officer, has become director of Liberty. According to the latest data as many as 1,800 people are on the payroll of the two stations.

Within several months beginning in mid-1986 Radio Liberty reshuffled its personnel. This was a direct consequence of the revelations made by Oleg Tumanov, former acting head of the RL's Russian Service, who has returned to the Soviet Union.

The joint RL/RFE budget for 1987 stands at $167.5 million with $42 million to be spent on technical modernisation. The number of transmitters is to increase from 45 to 51. Construction is due to start of a powerful relay complex in the south of Israel to beam programmes to the Soviet Union and other socialist countries, to Afghanistan and East Africa. Between $200 and 300 million are earmarked for the project which would involve the building of 16 new 500-kilowatt transmitters.

This is just some of the latest information on the activity of the radio stations which are financed by the USA through the CIA and which beam subversive broadcasts and engage in espionage against the USSR and other socialist community countries. The data was published in 1986 in *The Christian Science Monitor* and *The Washington Post*, and in the US journal *Broadcasting*.

While admitting the subversive character of the RL/RFE programmes the American and other Western press media say nothing about the activities of the intelligence departments that use these stations as a cover. New data on this can be gleaned from the articles and interviews by those who have returned to their countries after breaking with these stations or after fulfilling special assignments.

AN "OFFICE" ON ST. GERMAIN BOULEVARD

If you happen to be in Paris and walk along St. Germain Boulevard our advice is not to go too close to the house at No. 193, where a small organisation under an innocuous enough name resides. Actually, the notice Department for Audience and Radio Broadcast Effectiveness Study is but a front for a unit of Radio Liberty, a CIA residence. Professionals from the CIA do not mention the full name of the department on St. Germain Boulevard. For one thing, it is too long, and for another, it is something of a misnomer. Instead, they use the handy shortened name, the Parta office.

The head of the office is Gene Parta, a US citizen. Like his deputy, Charles Alain, he is a professional US intelligence officer. Only the initiated know the delicate, not to say dirty, nature of the CIA assignments carried out by the office along with audience surveys.

Over and above its main duties, the office conducts surveys among Soviet citizens temporarily staying abroad—on business, as tourists, or visiting relatives—and among former Soviet citizens. The Parta office staff tailor their methods to each category of pollees. All sorts of renegades and defectors are ready talkers but their information is not trustworthy because, eager to please, they lie and invent things. But they are in a way more promising material because they can be more readily involved in subversive activities. Soviet citizens are less forthcoming, but the information obtained from them is more valuable. Most of the Parta office staff are fluent in Russian and are adept at drawing out informa-

tion. They know how to engage people in conversation without arousing their suspicions. They gather information like bees and bring it to their beehive on St. Germain Boulevard. They feed it to a computer which processes and sorts it out. About 20 per cent of the data is made available to Liberty and Free Europe, the rest going straight to CIA headquarters in Langley.

The Audience Study Department has an expansive network of correspondents stationed in Western Europe, the Near East and Southeast Asia. These correspondents are links in the intelligence network and are registered as such with the CIA. Their number, once mentioned in the US press, is staggering—800. Of course, the Paris office is not the only intelligence unit in Radio Liberty. But it has received a lot of publicity in the press because of the recent setbacks in its clandestine activities. We shall tell you about one such setback in a moment. But first let us make a historical digression and look back at the origins of the RL/RFE to better understand why these radio stations have become what they are today. We have already mentioned 1949 as the birth date of Free Europe. Two years later, in 1951, "private individuals" formed the American Committee for the Liberation from Bolshevism and a radio station. Initially, it was named Liberation, but was later renamed Liberty. It began broadcasting to the USSR in March 1953.

It was not however until 1975 that the two radio stations were brought together under the same roof in Munich.

The overt tasks of these subversive stations were formulated by Kelly, one of the first leaders of the American Committee for the Liberation from Bolshevism, who said that the radio station's main aim was to influence the thinking and direct the will of the Soviet peoples towards the need to eliminate the communist regime. Operating as an emigre station, it can speak on behalf of its countrymen, criticise the practices in the USSR and call the populace to anti-Soviet action.

The tasks then were specifically determined as "anti-Soviet actions." What about the methods? The methods are diverse and by no means confined to journalism. Here is an excerpt from a top secret official document. It says: I, the undersigned, know that Radio Liberty has been established by the CIA and is financed by it. Divulging this information carries a fine of $10,000 and a prison sentence of up to 10 years. All staff members of Liberty signed this CIA memorandum. Besides, an International Broadcasting Council set up on the US President's order in the mid-1970s is supposed to provide a cover for the links between the US special services and propaganda bodies such as RL/RFE. This is irrefutable proof that the radio station and its activity are controlled by the CIA. And yet each time new proof of the RL/RFE's link with American intelligence is provided the US administration denies the fact.

Not infrequently Western writers, while admitting the aggressive nature of the RL/RFE broadcasting, call them weapons of "ideological struggle". That is essentially untrue. The RL/RFE are not weapons of "ideological struggle", but of sabotage and propaganda. These are by no means identical notions.

When Oleg Tumanov, speaking at a press conference in Moscow and on Soviet television, gave convincing evidence of Liberty's subversive and intelligence activity, evidence he had gathered over many years, the Western press, apparently following an order, completely ignored these sensational revelations. This despite the fact that in the interval between Tumanov's disappearance from Munich and his surfacing in Moscow, the press was full of speculation about his whereabouts. When he made a public appearance at the USSR Foreign Affairs Ministry's press centre, Western journalists made an open attempt to disrupt the press conference. At some points their behaviour during the press confe-

rence verged on hooliganism. They were led by Nicolas Daniloff, a *U. S. News & World Report* correspondent, who was later expelled from the Soviet Union as a spy.

Shortly after the Moscow revelations it became known that all the local offices of the RL/RFE had received a circular instructing the staff to deny any links with the CIA. The categorical tone of the letter was due, at least in part, to Tumanov's revelations and to an incident that had occurred in a small North European country. The incident involved Gene Parta and as far as we know has not yet been reported in the press.

GENE PARTA'S MISTAKE

A few years ago Gene Parta, head of Liberty's Department for Audience and Radio Broadcasting Effectiveness Studies made the acquaintance of a young journalist, a graduate of a respectable university in a small North European state. The young man must have been very naive at the time, but not indifferent to money. That is why he readily agreed to carry out some assignments for Gene Parta. They were very simple, but unusually high paid. The budding journalist was to gather and process data on the popularity and impact of Liberty broadcasts. Before long the nature of this cooperation became clear. Parta told him to get his sources in Soviet territory. The journalist might have guessed that this was an intelligence assignment, but apparently money was more important for him. So he became a virtual agent of Parta, i. e., a CIA agent.

His assignment called for corresponding methods. The "researcher" from a Northern country soon began to recruit agents himself. He acquired a very valuable "agent" in a remote corner of the USSR (Frunze, the capital of Soviet Kirghizia). Parta's agent was proud of his "agent" and also patted himself on the back. Parta was proud of the information, coming from remote Frunze, paying no attention to its reliability. What was more important for him, was that the materials provided the basis for reports to Langley and NATO headquarters in Brussels, and were used to work out guidelines for the nuclear-planning group.

Parta generously rewarded his "journalist". For one thing, he sincerely believed that the information was important and interesting and for another, no one controlled the pay which came out of secret CIA funds. The Northern agent got $1,000 for every bit of information, regardless of its volume and value. This is not to say that Parta was so generous. He was not just paying his Northern agent for specific assignments fulfilled, but grooming him for becoming a CIA resident in his country. It should be noted that this particular nation has long-standing friendly relations with the Soviet Union, and the Central Intelligence Agency is interested in getting the full information on the nature of and perspectives for their bilateral cooperation.

The agent was rising up the official ladder at home and in his secret activities. Having joined the staff of the country's biggest newspaper, he was appointed CIA resident in that country. He operated under the official front of a Branch of Liberty Radio Station. The CIA gave him a handsome salary of tens of thousands of dollars a year. He had earned his keep. He had recruited several of his countrymen for the CIA. It also became clear that, on the assignment of his bosses, he was studying the way of life and habits of his country's political leaders and even top security officers. One wonders why, since the country has perfectly normal relations with the United States. The answer seems to be that the CIA is not happy with the nation's friendly relations with the USSR. It is up to that country's authorities to draw the conclusions concerning their citizen who was collaborating with foreign intelligence and was in its pay. But for the world public it was another chance to see the real nature of the activities of Radio Liberty which is but a front for the CIA.

We have told you of the setbacks suffered by the RL staffers who are carrying out intelligence operations. But subversive broadcasting services too face serious problems. One is personnel. *The Washington Post* wrote recently that the "waves of dissension [are] said to weaken Radio Liberty". According to the article's author, John Goshko, "for two years, Radio Liberty, the US-supported station that broadcasts to the Soviet Union, has been troubled by internal dissension that some critics think has weakened the station as an instrument of US policy and made it an arena for refighting obscure doctrinal battles from the mists of Russian history"

John Goshko probably makes the situation appear more complex than it is. But he is right when he says, in the same article, that "right-wing Russian emigres taking advantage of the Reagan administration's hard-line view on communism, have infused Radio Liberty's programming with overtones of anti-Semitism, extreme Russian nationalism and anti-democratic sentiments". Granted, all these elements are present in the RL programmes. But the odd combination of renegades of every hue gathered under Liberty's roof has also brought every kind of Zionism and nationalism into its broadcasts.

"Three-quarters of the combined staffs are East European emigres from the countries served by the two radios", writes *The Washington Post*. "That has produced a frequently volatile chemistry between traditionally hostile nationalities. The problem has been most acute at Radio Liberty"

Hence, the newspaper believes, the challenge facing the new RL/RFE head, Eugene Pell, is to "keep Radio Liberty on the beam as a professional station that will be respected by its Soviet listeners. But, for starters, he has sought to establish greater control over program content by moving some Russian language broadcasts from Munich to Washington, where they can be supervised more closely, and by instituting comprehensive program reviews."

Truly, Mr. Pell has his job cut out for him. In a circus or a zoo, people marvel at the patience of animal tamers who make a cat nurse rats, or a fox befriend a rooster. We marvel at the perseverance of a person who has managed to tame age-old instincts. But when former nazi underlings, war criminals who had massacred people and sent women, old folk and children into gas chambers only because they belonged to a certain nationality are gathered under the same roof with people claiming to be "champions of Jews", "champions of the rights of Soviet Jewry" and who take turns with them to speak through the same microphone, one does not feel surprise, but disgust. One wonders at the degree of moral degradation of the people born after the war who ply their dirty trade in such grisly company. Only their bitter hatred of socialism and everything Soviet and progressive could have silenced elementary human instincts.

Perhaps nowhere but in the RL/RFE can one find working under the same roof such a motley assemblage of types, from sadistic criminals to dissipated and cynical people lured by easy money. Here are brief biographies of some of the well-known former or present members of the RL.

"My name is Nikolai Gradoboyev." This was the signing-on line of one of the oldest RL commentators. The real man behind it was Lev Dudin who had voluntarily given away Soviet patriots to the Gestapo. Towards the end of the war, he was transferred to Berlin, where he remained until the defeat of fascism. He went into hiding, eventually made

his way to the Americans and offered himself to the special services. He was sent to Radio Liberty as a "specialist" on the USSR.

Vasili Smirnov, another recognised expert on Soviet affairs, was a village elder and an executioner. A broadcaster calling himself Lanin, who commented on Soviet economic problems was Igor Glazenap, a nazi collaborator and an anti-Sovieteer with a long record, an activist of anti-Soviet organisations in the postwar period.

Many of the "national" (non-Russian) members of Radio Liberty staff from the Soviet Union can boast an equally distinguished record. One can mention Garif Sultanov, the head of the Tatar Bashkir section, for many years hiding himself under the transparent alias Sultan Garip. In 1942 he defected to the Nazis and in early 1943 was planted in the underground movement among prisoners of war. The biggest "feather in his cap" was the denunciation of a group of patriots, which included the poet Musa Jalil.

Among the people who had worked for or actively cooperated with the Gestapo was Tuliaganov (Veli Zummun), Tsvirko (Surko), Menchuk, alias Olin or Irkolin, and Tenson (Metner). It is not by chance that these criminals who call themselves journalists are hiding under pseudonyms. The relatives of the people they had tortured and shot are still alive, and should these broadcasters fall into the hands of justice they would be liable to severe punishment. And such a possibility cannot be ruled out.

But time flies. Liberty staffers from the emigre White Guards and war criminals are leaving the scene, or are being discarded by Americans, along with out-dated equipment. The new people replacing them are "worthy" of their predecessors.

Former Soviet citizen Vladimir Maximov was not a Hitlerite collaborator because he was a child during the war. But his views would have made him one. The people who worked with him at various stages in his career described Maximov as a "very unpleasant individual". Maximov pushed his way to the editorship of *Kontinent* journal. The original idea was that *Kontinent* would bring together all the anti-Soviet and anti-socialist elements engaging in subversion against the socialist community countries. However, the material available was barely enough to put out a few issues. The journal's portfolio was growing thinner and thinner. So Maximov switched over to Radio Liberty, he had to make a living. The people who know him say that Maximov is relentless when it comes to bargaining for higher royalties. Along with another anti-Sovieteer A. Sedykh, one-time editor of the *Novoye Russkoye Slovo*, Maximov created a press centre to cook up brazenly anti-Soviet materials.

The subversive radio station's art commentator is A. Glazer, a dishonest man often exposed by his own colleagues. In his after hours Glazer speculates in modernistic paintings. Among RL's experts in various branches of science are Roitman, Agursky, Davydova, Ventsov, Kroucher and Finkelstein. Most of them promised to give their lives for a "great Israel" when leaving the USSR, but preferred to stay with Liberty instead.

The value Liberty puts on them depends greatly on their record and official status in the "Soviet" part of their biography. So, they shamelessly exaggerate their posts and the offices they held, while in the Soviet Union. Finkelstein, for example, claims deep knowledge of Soviet space exploration. One wonders, however, how he has managed to come by this knowledge being a poor member of the staff of the popular science magazine *Znaniye-Sila* before he emigrated. I. Zemtsov who claims to be an expert on Soviet medicine, has similar credentials. Yet he is listed as "scientific worker" on Radio Liberty and even in the CIA files. His knowledge is mediocre and his services are dubious. In his time, he

had been expelled with disgrace from the medical institute in Yaroslavl for trying to steal the work of his younger colleagues.

A man by the name of Kabanchik has exhibited some artistic prowess and thought up a new programme called "Through the Eyes of a Recent Muscovite." The trouble is that he left Moscow back in 1972 and forever. Before that, from 1961 to 1968, he was in internal exile for parasitism and speculation. Kabanchik had prepared himself carefully for his departure to the West diligently collecting anti-Soviet jokes, gossip, and dirty stories. All these came in handy when he joined Liberty.

Another "expert", M. Geler, who sometimes calls himself Adam Krochek, graduated from Moscow University and contributed to several Moscow magazines. He is best remembered by the staff of the *Soviet sbyat Grapho* journal he has stolen 61,000 rubles together with the journal's art editor, A. Gessen. This earned him a 15-year prison sentence. Upon being freed, Geler-Krochek emigrated. The criminal became a "consultant" to the Paris branch of the RL.

At one time an odd young couple could be frequently seen in Liberty's office in Munich. The Mablises knocked on all the doors assuring the bosses of their adherence to Zionism. Leonid Mablis, born in 1945, managed to get a degree in journalism from Moscow University in 1971. He was not a brilliant student partly because he had many side interests. Bitter because people did not recognise his "talents", Mablis decided to emigrate to Israel and went through with his plan. There he met the daughter of Alexandrovich, a singer of Neapolitan songs, and they got married. They got a job with Radio Israel. Before long, however, they embarked on a financial swindle and had to flee. They posed as convinced Zionists to gain a foothold in Liberty and to earn themselves the reputation of specialists.

Another couple whose name is frequently mentioned on the air are the husband and wife Victor and Alya (Sarah) Fedoseyevs. They carry Israeli passports, but there is much to suggest that they are trusted people of the US secret services. The materials they put out could only be prepared in collaboration with secret services.

These days, renegades come to Liberty loudly proclaiming that they had committed no crimes and that their hands are clean. Let us face it, not many staffers on Liberty can boast of that. The story of one such person, Vasili Freidkin, could hardly evoke sympathy. A Byelorussian, he has behaved as wickedly towards his homeland as his elder colleagues. No spring chicken himself (born in 1947) he is a new recruit on the RL. His mental infantilism is partly explained by his background. Vasili was a late child born to David Freidkin, an accountant, and his wife Sarah Freidkin, a tailor. He was a spoiled child, did poorly at school, had a taste for the good life and squandered his parents' money. In 1966 his parents managed to enroll their son in the correspondence faculty of the Byelorussian University. The high point of Freidkin's career (he majored in journalism) was a few months' stint as a proof-reader with a small newspaper and an unskilled workman at a fancy goods factory. When Vasili's parents died in the mid 1970s, he had to take care of himself. It must be put to his credit that he quickly found out the lay of the land and took up the lucrative roofing business under the guidance of his newly acquired father-in-law. Vasili married with an eye to emigrating to Israel, where his wife's uncle lived. However, he never reached Israel and went to the USA instead. In due course developments known only to him and the CIA brought him to Radio Liberty. It was there that a beginning roofer, Vasili Freidkin, evolved into a "master journalist", "specialist" on Byelorussia under the alias Krupsky.

Freidkin-Krupsky joined the ranks of Zionists who have become entrenched in Liberty. As Oleg Tumanov revealed in his TV broadcast,

about 40 per cent of the air time on the RL is devoted to the notorious "Jewish question". He also said that about 80 per cent of the current members of the Russian service are Zionist-minded persons.

EXTRA SOURCES OF INFORMATION

Liberty is increasing the volume and diversifying its broadcasting, but only in the direction of more slander. This brings the RL/RFE into a very happy partnership with another firm closely linked with the secret services, Amnesty International. This organisation calls itself a movement independent of any government, political group or ideology, economic interests, or religion, "monitoring" human rights in the world.

It is not our intention to study the activity of Amnesty International as such. But it would not be irrelevant to say that this organisation receives money from Western governments and secret services in circuitous ways. For example, Amnesty International has not infrequently used confidential documents marked "specially for the RL/RFE staffers". Some leading members of Amnesty International are involved in coordinating the activities of Liberty and Free Europe.

Returning from Munich, those members of the RL/RFE staff who had decided to sever their ties with these stations, gave convincing evidence that one unit of the RL is engaged, together with Amnesty International, in preparing and publishing slanderous materials about alleged human rights violations in the Soviet Union.

The research section of Radio Liberty is headed by Keith Bush, a CIA agent said to be the nephew of US Vice President Bush. This unit prepares "News from the USSR", an opus that comes out bi-weekly and is published by Kronid Lubarsky. A clever scheme has been devised to give verisimilitude to this "news". The "research unit" prepares the newsletter, which is sent to the "Samizdat Notebooks" publishers in Brussels, to be printed in Russian and English. Lubarsky, whose job is to make the news as believable as possible, is billed as a "member of the Moscow group of Amnesty International."

The fraudulent circle is closed when the RL/RFE beam this information to the USSR and the other socialist countries. The same means and methods are used to cook up information on religious life in the USSR.

It would be interesting to note the difference of approach, say, between the Voice of America and Liberty in covering religious themes. VOA's broadcasts focus on news of Church life and sermons making its pitch to an audience of religious people who, according to the Voice of America, only need to be kept abreast of the times.

By contrast, Liberty aims at a youth audience. Along with highly biased reviews of religious life in the USSR, it broadcasts polemical commentaries on philosophical questions, discusses atheistic materials published in the Soviet press. It reports on alleged persecution of religion in the USSR. The information is presented in such a way as to evoke young people's condemnation of injustice in general, regardless of whether the listener is religious or not.

The authenticity of the information is on a par with that prepared by Amnesty International. The conclusions hit the usual circuit: Amnesty International the RL/RFE and other "voices." Amnesty International cites the radio stations and the stations cite Amnesty. Examples can be multiplied. Liberty and Free Europe are tracing every step of Anatoly Shcharansky, expelled from the USSR for spying, treating him as an authority on Soviet affairs.

These notes on aspects of the subversive RL/RFE team would not be complete without mention of the illegal nature of this organisation in general. During the 20 years between 1952 and 1972, the United States denied it had anything to do with Liberty and Free Europe. It repeatedly stressed that they were run by individuals and private organisations.

This brings to mind some statements made by the Nuremberg Trials. In considering the cases of certain war criminals it stressed that the norms of international law are applicable to individuals, which can be regarded as the extension of the application of these norms with regard to *private organisations* and their agencies. The indictment, the witness testimony and the verdict also refer that any propaganda that helps to unleash and wage war is outlawed. In other words, subversive propaganda, and it is impossible to deny that the RL/RFE engage in it. So, in accordance with international law, references to the private or non governmental character of the RL/RFE do not release them from the responsibility. All the more so because proves exist that they are linked with and controlled by a governmental organisation (the CIA, USA).

In supporting and financing the RL/RFE, the United States is going back on its own commitments set out in the US government's note to the Soviet government dated November 16, 1933. The document says that the USA would restrain and keep all persons in government service and all the organisations of the government or organisations under its direct or indirect control including organisations receiving financial assistance, from any overt or covert act fraught with damaging in any way the tranquility, well being, order, or security of the Soviet Union as a whole, or any part of it from any act directed at instigating or encouraging armed intervention, or any agitation or propaganda aimed at violating the territorial integrity of the USSR, or violent change of the political or social system in the USSR. The USA, under that document, pledges to respect the inalienable right of the USSR to build its life within its own jurisdiction the way it sees fit and to refrain from any interference in the internal affairs of the Soviet Union.

Even these notes which cover only some aspects of Liberty activities, prove not only that its existence is illegal, but that all its broadcasts run counter to the US declared principles of relations with the Soviet Union.

/13104
CSO: 5500/1034

EC DATABASES, ELECTRONIC MAIL SERVICES REVIEWED

Luxembourg IES NEWS in English No 8 Feb 87 pp 2-3

[Article: "IES Data Collections--A Part of ESPRIT Information Dissemination Activities"]

[Excerpt] The IES Data Collections

Beyond the news type and the information in printed form, reference data are always essential in any search for full information. This type of data has often been requested. To satisfy this demand, data were identified and structured to respond to the following questions:

- What are other ongoing R&D projects in IT. And how do I get in touch with their participants?
- How can I find, if a person with whom I wish to communicate, can be contacted through an electronic mail system and which one?
- How can I identify research organisations in Europe which offer specific services through facilities?

A service to collect, encode and provide this type of data was defined with the following considerations:

- The information should be made available publicly via Public Switched Data Networks (PSDN) and a well-supported host.
- To justify the effort, the information should go beyond ESPRIT [European Strategic Program for Research and Development in Information Technologies] program boundaries and encompass at the very minimum all public R&D on IT in Europe.
- Data Collections should be made through organisations which already collect this type of data for their purpose; the data should also depend on the same organisations providing their updated collections.
- Data structures should be simple and at the cost of redundancy, offer simplicity in updating, accessing and searching.

The ECHO Host in Luxembourg was selected to implement the database and IEGI [European Institute for Information Management], as part of ESPRIT/IES, to do the collection, coordination, reformating, data entry, documentation and updating. Work started in May 1986 and the service was named IES Data Collections.

In parallel, the European Association of Academic Networks (RARE) had identified the need for information sources development. To facilitate the work of the collection. but also to provide a mechanism to the upstarting of RARE to satisfy one of its requirements, the service was discussed at the RARE workshop in Copenhagen.

It was agreed that RARE participants will provide input and feedback regarding future evolution of this service.

The Service was launched and demonstrated successfully during the ESPRIT Conference last September. It consists of three Data Collections:

1. People in Electronic Mail

This Data Collection serves as a directory of persons in different electronic mail systems and each record contains the name of person, affiliation, address, electronic mail system, system domain, electronic name representation. Often, for a given site, the electronic mail address of a postmaster is given. Through him other people, users of that site, can be reached. There are currently about 3,000 records contributed by EuroKom, QZ-KOM, CERN [European Center for Nuclear Research] and the UNIX/EUNET network. Additional data are expected from the EAN hosts (academic sites using the University of British Columbia EAN software), JANET network and various centres from the Netherlands, Belgium, Denmark and France. The EARN [European Academic Research Network] network has also promised to provide postmasters' electronic addresses.

During the EUREKA/COSINE [Cooperation for OSI Networking in Europe] definition workshop in Brussels last November, it was agreed by the appropriate work group that a centralised directory of this type will be a useful tool until standards are available for distributed X-400 related electronic mail directories.

2. Publicly-funded IT Research Projects

In this collection, the user will find reference information to R&D projects ongoing in Europe at the moment in the field of IT. The file includes primarily projects from European Community programs such as ESPRIT, RACE (Research in Advanced Communication Technologies for Europe), COST 11 (European cooperative program in the field of teleinformatics), DOCDEL (industrial development program for electronic publishing and delivery systems), EUROTRA (program in linguistics and machine translation), MAP (Multi Annual Program in the field of data processing), etc. However, national programs have also contributed information, thereby allowing the interested researcher to identify initiatives which are complementary or parallel to this interest and establish contact with the organisation responsible for the project. The information given is: project title, project description, program name, prime contractor, project contact person and address. There are about 500 projects indicated and additional data have been promised from Germany, Greece, Ireland, Holland and Belgium.

3. Sites and Facilities

The third Data Collection was identified primarily by the RARE community. The purpose here was to create an inventory of organisations in Europe which offer specific computer services to their local communities and which are or could be part of a network with the potential to become nodes to a wider European network. The present record structure includes site name and address, contact points, facilities description and services offered. There are approximately 1,000 records at present, primarily from the UK and Germany, with more promised from Holland, Denmark, Ireland and France.

How To Access this Information

All three Data Collections are mounted on the ECHO Host in Luxembourg, which uses a Siemens mainframe and the GRIPS database management system. The user can access this host with any asynchronous telecommunications terminal or a personal computer. Connection can be made through national X-25 Packet Switched Networks, using the NUA of ECHO which is: 270448112.

Once connected, users need to type the three letters IES, which is the public password and which provides menus with further information about accessing the three Data Collections. Potential users may wish to obtain a free short Users' Guide for the system by calling the IES Help Line (+352-453030). Useful search commands are explained in this document.

The Future of this Service

European Cooperative Research Programs have been steadily overcoming national barriers. Researchers, but also research managers and public administrations, need to have up-to-date information on research programs at their definition phase and during their implementation. This is useful in order to achieve maximum efficiency by cooperation and avoidance of duplication. It is, however, equally important in order to associate individual, organisational or national priorities with such initiatives and allow research teams to be in a better position to participate.

The IES Data Collections can, in this respect, be a very useful preliminary effort which may evolve into a useful and much needed capability.

CSO: 3698/A169-E

RARE, EARN NETWORKS ENCOURAGING ISO STANDARDS IN EC

Luxembourg IES NEWS in English No 8 Feb 87 pp 6-8

[Article by P. Bryant, Rutherford Appleton Laboratory, UK: "EARN and RARE: Complements or Rivals"]

[Text] There has been much discussion about whether RARE and EARN are in competition or whether they complement each other, whether there is a need and/or future in Europe for both. It is therefore timely, that a critical examination be made of the role and functions of these two much talked about entities.

Firstly, definitions: RARE, the Associated Networks for European Research, is not a network, but an organisation of national research networks. It is dedicated to three principal objectives, the encouragment of
- ISO networking within the academic and research community
- the interconnection of existing networks
- the migration of existing networks to the use of ISO protocols.

EARN (the European Academic Research Network) on the other hand is a network giving service to the academic community in Europe, but is not concerned with research and development of the technology used, as long as it provides a service to its users.

Prima faciae the two are thus complementary: EARN being the pragmatic service provider of today and RARE looking to the future by urging Europe towards a single set of network standards. Furthermore, EARN is not greatly concerned with RARE's primary aim of full European network interconnectivity, whilst RARE has only a minor interest in the provision of a physical network.

The reality is not quite as simple. EARN today is a very large network of some 350 computers of different manufacturers, it carries a vast volume of traffic, it is cheap to the user, it is international and it is growing, but it certainly does not operate using ISO protocols. RARE on the face of it has an uphill struggle: there is very little current ISO networking in Europe or indeed elsewhere and the prospects for an early change to ISO protocols appear not too good to current EARN users. Because of its popularity and growing use, EARN may well act as a brake on the installation of ISO network methods. The main and irrefutable argument of RARE is that it is only by adopting a full ISO working that high-quality services can be assured for all types of computers.

What it boils down to is the age-old conflict of whether a service exists for its users or the users for the service: here there is the additional consideration that not all potential users could connect to EARN and be certain of high-quality service now, whereas waiting for the full implementation of ISO protocols would give all potential users the same satisfactory usage. The question then, is really again one of when can RARE provide the needed infrastructure and impetus to reach this end; will EARN by that time have become so entrenched and with so many ad-hoc solutions to problems arising, that it will prove difficult to be superceded.

EARN had a head start and made use of proprietary protocols because these were available and because the hardware and software were already in place on many of the computer installations forming the network and all that was required was the provision of leased lines and modems. What is more, some of the protocols had already been ported to other proprietary hardware. The network could also grow in a piece-meal manner, although again practice showed that some form of network management was required to keep routing tables in order, to ensure optimal placement of new lines and to provide 24-hour service at key sites, once there were more than 100 participating sites. In retrospect, other technologies would not have allowed of such a fast start up and growth, been as cheap for the users or have been available for the most popular proprietary computers. A network based on public X-25 services would have been an order of magnitude more expensive than leased lines because of the high PTT tariff charges, and a private X-25 based network would have required much more effort, and hence time for providing service. Worse, had a private X-25 system been selected, the absence of adequate protocols other than those of e.g. the UK Coloured Book (released at about that time) would have caused additional costs and more importantly, delays.

It is worthwhile stressing that PTT tariffs are an area where both EARN and RARE have much cause for concern. The costs of the current traffic handled by EARN could certainly not be financed. Assuming EARN migration to public networks once RARE has shown the way, then it might well be that the current estimates of a tenfold increase in traffic may be severely out because of restriction caused by current X-25 tariffs: these are adjusted to low-volume transaction traffic and not to the high-volume bulk traffic which will be generated by research usage (and other applications).

The PTTs claim that their current X-25 services are not very profitable: many new services show this characteristic in their early days, but if high costs frighten away potential users then profitability will always stay low. Here it would be tragic, if costs or traffic would be the cause of preventing communication across Europe.

The success of EARN varied from country to country: the FRG greeted the availability with enthusiasm (DFN, the German Academic Research Network was established only later), whilst in the UK, the existence of JANET, the Joint Academic Network, resulted in a less favourable reception. Most other European countries accepted the benefits of EARN to a greater or lesser degree.

The management of EARN, which is incorporated under French law, is vested in an elected Board of Directors, one for each participating country. Because of the use of leased lines, licences have had to be obtained from each PTT involved. The present position is that as a consequence of CEPT intervention, licenses will probably expire at the end of 1987, by when CEPT expects EARN to have migrated to the public networks and ISO protocols. There is also a CEPT recommendation for imposing a volume charge on traffic.

In order to achieve this migration, EARN has commenced activities in this direction: as a first step an experiment has been instituted between eight international EARN centres using an X-400 system. Results are expected by the end of 1986. If positive, further work will be initiated and plans are already in hand to add the ISO file transfer protocol FTAM and the CCITT interactive protocols known as "triple X". There are some reservations about the feasibility of migrating to the ISO protocol by the end of 1987, since these are still not fully tested under severe conditions and a year's delay may possibly arise. This is because the current experiments involve only one type of proprietary computing equipment operating under the identical operating system. Tests with other products will have to be conducted and concluded satisfactorily first.

Another aspect which will require careful investigation is the capacity of the public networks and international lines: PTTs have not been too forthcoming with these data and there have been some known problems. There are suggestions that the current expectation is a transport rate of no more than 2K bits per second on any connection. Against this the currently used 9.6 K leased lines are becoming saturated and the use of 48 K lines is probable in the near future. It is very difficult to see how the public networks can absorb the current traffic, let alone that if the band widths are increased. Possibly EARN may try to continue leased line usage even after migration to ISO protocols.

It must be stressed that EARN is strictly for noncommercial use: research groups of commercial companies may join as "associate" members, but these may not communicate with other associate members and usage must be strictly noncommercial.

EARN is connected to many other networks and gateways exist or are planned to many national research networks.

RARE has a different history. It is worth noting that there was an early attempt in 1983 for a Commission supported move, known as "ZANDER" initiative on European Harmonisation activities (Footnote) (In recognition of Prof. Zander's leading role at the Hahn-Meitner Institute in Berlin) on academic cooperation in networking, with emphasis on harmonisation of standards. Whilst there was interest shown by manufacturers, academic interest ceased when funding ended. A further Commission initiative resulted in the May 1985 meeting which laid the foundations for RARE with the aims listed at the beginning of this note. At the same time working parties were established in eight areas:

- setting up a network association (resulting in the formal establishment of

RARE)
- liaison with CEPT
- message handling
- file transfer
- virtual terminals
- X-25
- network operation
- documentation and directories.

Since then, much progress has been made. It is however appropriate to stress that the Copenhagen meeting last year showed a general support for the concept of RARE and the certainty that most, if not all European countries would become members. CEPT too has indicated its willingness to cooperate with RARE.

In the recent past, there have been discussions with the Commission concerning a number of projects aimed at the provision of an ISO network infrastructure. Such activities should help to maintain the momentum of RARE and increase contacts between participants.

The aims of RARE are long term and will therefore not be achieved tomorrow: they are however of overriding importance in a European network development. Much work remains to be done in developing and testing the protocols, and the availability of commercial products at present is also limited. Far more important is that the setting up of RARE at this stage has given it the opportunity to influence both manufacturers and network providers to make available products which will interconnect and are suitable for the academic community. Thus much of the RARE activity is concerned with the communications standards which need augmenting with "functional standards" to ensure that the products interwork. Indications are that this approach will be successful.

It must be emphasised that RARE has no intention of setting up or operating a new overlay network. This, in RARE's view is the task of the PTTs. RARE does have the obligation to persuade the PTT's to provide networks of the quality required and at a cost the user community can afford. It is for this reason alone that liaison with CEPT is a high propriety activity.

A heartening feature of the present situation is that a number of members of the RARE Council of Administration are also on the EARN Board of Directors; furthermore EARN has been accepted as an international member of RARE, so there is much contact between the two organisations. There is some residual unease in RARE that EARN will divert scarce resources from ISO activities and that the ultimate migration of EARN to ISO protocols will prove more difficult than expected.

EARN has and continues to fill a need, the future of which will be made all the more reliably fulfilled for all by the RARE initiative. The aims of service now (by whatever means) and an ideal system in the future are difficult, but not impossible to reconcile. The conclusion by the present author, who has one foot in each of the organisations, is that EARN and RARE are complementary: EARN provides service, RARE plans the future. With present indications of close cooperation between the two, prospects are good: there is no conflict or rivalry.

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AGENCY WEIGHING FIBER OPTIC CABLE NET FOR WEST COAST

Oslo AFTENPOSTEN in Norwegian 9 Mar 87 p 4

[Article by Rolf L. Larsen]

[Text] A fiber optic telecommunications cable network along all or portions of the Norwegian coast could become a reality before the year 2000. A network of this type could become our future "telecommunications highway" for decades to come. It would cost about 800 million kroner to construct the network from Drammen to Kirkenes. "There has been an enormous increase in the need for telecommunications. As a result, the Telecommunications Service is now considering a fiber optic cable for the coast. After all, most people in this country live along the coast," section chief Kare W. Olsen of the Telecommunications Directorate told AFTENPOSTEN.

The section chief stressed that fiber optic cables have a far greater capacity than telecommunications via radio lines. Radio lines are the predominant telecommunications system in Norway. This is primarily because of the great distances and the geographic conditions. At present telephone, television, data, radio, and other telecommunications services are transmitted over almost 1,000 radio line stations.

Up to 6,000 telephone conversations can be transmitted over this network simultaneously. They are further transmitted by way of cables and smaller lines.

40,000 Calls

The planned fiber optic sea cable network along the coast will be capable of handling about 40,000 telephone calls simultaneously. Eventually, this could be increased to almost 1 million.

The Telecommunications Service recently began studying the feasibility of a fiber optic sea cable. This study will be complete by next summer. Among other things, they will study seabed conditions and the possibilities for insulating and protecting the cable. The Coastal Directorate is working together with the Telecommunications Service on the plans. There are also many customer needs that must be considered along the coast with regard to the fishing, shipping, and offshore industries.

It has been indicated that a cable of this kind would require a safety zone of 400 meters.

"Now we have decided that we will not require such a zone and we are working to find better and more reliable ways to protect the cable and to determine the best possible route for it along the seabed," section chief Olsen said.

In 2 Years

If the project is carried out, it will probably begin in 1989. The first stretch will probably be between Stavanger and Bergen. It will take almost 10 years to lay the cable from Stavanger to Tromso. Later, it will be decided whether or not the cable will be put into place along the entire coast.

In the past, fiber optic cables have been placed in the sea over short distances in Norway. A cable was installed between Flam and Aurland in Sognefjorden in 1983. It is now being used and the results are extremely positive. Last year the Telecommunications Service laid cables in Mjosa between Hamar and Gjovik. This year, underwater cables will be installed to connect Drammen, Svelvik, and Holmestrand and between Leikanger and Forde.

Over the years, about 4,000 sea cables for telecommunications have been put into place. They are copper cables and most of them cross fjords along the coast. They can handle only a few hundred telephone calls each.

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PAPER LAUDS LATEST PROPOSALS FOR TELE-X SYSTEM

Oslo AFTENPOSTEN in Norwegian 2 Mar 87 p 2

[Editorial: "Delayed, But Improved"]

[Text] To begin with the conclusion: Four live TV channels will be a far more attractive use of the future Tele-X satellite than two delayed rerun telecasts. For this reason, the plan proposed by top Norwegian broadcasters should be welcomed and studied with great interest. No one has been especially satisfied with the other solution.

Everyone has had a chance to think over the matter one more time simply because the entire Tele-X project has been delayed 1.5 years--so far. The French rocket company that will place the Norwegian-Swedish satellite into orbit has been hit by a series of setbacks, so that the satellite cannot be launched until late 1988 or early 1989. On the other hand, this waiting time can be utilized to develop the original project. Improved receiving techniques on earth mean that it is possible to send two weak signals per transmitting tube instead of one strong signal. Consequently, several programs can be transmitted at the same time.

But this advantage is not without its cost. The most clear-thinking experts indicate that it could cost 80 to 100 million kroner to modify Tele-X. If this work is not finished in time, new problems will arise and there will be even more additional costs for launching the satellite. Who will pay the extra costs? The TV companies themselves? Government funds? And which government funds?

The question is further complicated by the fact that one of the four parties who signed the agreement, the Danish broadcasting chief, represents a country that, until the very end, was totally uninterested in the entire Nordsat project. In addition, Denmark is not a part-owner of the satellite project. Is Denmark willing to pay to improve someone else's property?

On the other hand, for the first time Tele-X can become something more than a technical experiment. The expanded transmitting possibilities mean that the satellite can be an important instrument in Nordic cooperation and in the cultural exchange among the Nordic peoples. It will become something more than a chance to increase the range of television stations. It will also make it possible to develop the sense of community among four nations.

We like to think of the Nordic countries as a cultural community and we like to talk about this. In many respects, however, the reality is totally different. The Swedish language is threatened in Finland, Danish is not understood in Sweden and Norway, and Denmark is rather indifferent to the other Nordic countries. Danes have become Europeans and not just Scandinavians.

Does this really matter? Can we not speak to one another in English when we fail to understand another Nordic language? Yes we can, but not without losing our membership in a Nordic family of 20 million people. We can expand the physical means of communications in the Nordic countries, but in the long run it will be a poor investment unless we try to maintain a high level of communications.

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ELAB RESEARCH INSTITUTE DEVELOPING FUTURE MOBILE PHONE SYSTEM

Oslo AFTENPOSTEN in Norwegian 14 Feb 87 p 23

[Article by Georg Parmann]

[Text] The Norwegian research institute ELAB is a central figure in the development of Europe's future mobile telephone system. When it is ready for sale--the goal is 1991--the system will have a market as large as the Norwegian national budget. The new mobile telephone will have a better sound quality, be able to handle far more traffic, offer a series of data services, be smaller and lighter, and especially, be available at a more reasonable price than today's mobile telephones.

There is no European standard for mobile telephones today. This has led to a confusing array of systems. The Nordic countries have the same system, called Nordisk Mobil Telefon (NMT 450 and 900). This is also used in several other European countries, but West Germany, France, Great Britain, and Italy each have their own systems.

CEPT, which represents telecommunications services in the West European countries, has called for coordination and for a new digital mobile telephone system. The group wants the system to be in operation during the early nineties. Eight companies and research institutes have developed proposals for the system. One of these is the research institute ELAB of the SINTEF (Foundation for Industrial and Technical Research at the Norwegian Institute of Technology) group in Trondheim, which is supported by the Research Institute of the Telecommunications Service (TF). In addition, two Swedish, two West German, two French, and one Finnish system are being developed. All the systems are based on data transfer. A voice signal will also be transmitted in digital form.

Decision Next Week

A broad-band solution is poorly suited to a country in which it is necessary to communicate over long distances and in which reflections from mountains raise serious limitations, according to project leader Torleiv Maseng. Consequently, the Nordic countries and Great Britain advocate a narrow-band solution. Otherwise, a joint European standard would be impossible. German

and French industrial interests at the ATR and SEK companies support a broad-band solution. If this solution is selected, it will be for political reasons.

If a narrow-band standard is chosen for West Europe, ELAB will continue to play a central role in the further development of the system. A decision is expected to be made next week.

At present, ELAB can only demonstrate a large, clumsy prototype. It has been used in an attempt to convince others that the idea works.

Will there be one winner in the competition?

"Once a standard is selected, the best of each participating project will probably be further developed and combined. The fact that we participated in the research and development means that we now have the know-how and can continue to participate in the project."

"Unlike in other countries, in Norway this has been a pure research project so far. On 6 March, along with TF, we will meet with representatives of Norwegian industry and discuss possible future developments. We must understand that the European mobile telephone market of the nineties will be at least as large as the Norwegian national budget, so I hope that Norwegian industry can continue what we have developed," Maseng said.

How can a relatively small Norwegian research institute compete with the Europeans?

"This is because at a very early stage some skilled people at TF, under the leadership of project leader Jan Audnestad, saw the need for the development work that has been done. He had some ideas and some clear goals and he stuck to them. Five years of research toward a specific goal, all paid for by TF, by the way, is now paying off."

Has it been a costly project that has required many workers?

"After an initial theoretical study that began in [illegible] Odd Trandem was hired to work on the project full-time. Several other people helped build the prototype. Our results show that it need not cost much--surprisingly little, in fact--as long as we have time to think about it," Maseng said.

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EB NORSK KABEL CITES SUCCESS IN FIBER OPTICS MARKET

Oslo AFTENPOSTEN in Norwegian 24 Feb 87 p 39

[Article by Kjell Aaserud]

[Text] "While the government has made information technology a high priority, the Telecommunications Service has placed bids for fiber optic cable on the international market. It would be unfortunate if the contract were to go to a country that does not let in competitors. If we open our doors for imports, it must be a reciprocal arrangement," Tore Egil Holte, administrative director of EB Norsk Kabel told AFTENPOSTEN.

Holte bases his fear of protectionism on several examples of fiber optic cable manufacturers who receive a higher price in their own country than on export markets. We are not allowed into these countries, he said. Holte sees the production of fiber optic cable as a significant industrial possibility. EB Norsk Kabel has invested 75 million kroner in fiber optics. "We are at least as good as our foreign competitors and we can make cable to order for various purposes."

Good Profitability

Last year EB Norsk Kabel had total sales of 772 million kroner, which was 100 million kroner over budget. This figure includes 166 million kroner from Wessel Industries of Ireland, of which EB Norsk Kabel owns 55 percent. The company's profits were high. This year's budget anticipates profits just as high as last year, which Holte describes as ambitious, considering that North Sea investments and investments in the construction sector in general are down.

EB Norsk Kabel is strong on the Norwegian market. To gain even better control of the situation, the company is now divided into three main areas with responsibility for communications cable, power cable, and special cable, respectively. Communications cable includes wire cable and fiber optic cable. Norsk Fiberoptikk, which has been a separate company located in Asker, has doubled its sales in 2 years. This company is now part of the new division, which is based in its Hokksund plant. Development and marketing will continue to be located in Asker.

"We believe we will experience strong growth in this area," Holte said. "The Telecommunications Service will increase it use both at sea and on land. For the cable alone, this could amount to 100 million kroner per year. So far, we have sold about half our fiber optic cable to countries that do not produce such cable themselves."

"The Norwegian market for power cable is steady, but not growing. It is difficult to export cable of this type. It is absolutely necessary to achieve top quality."

Strong Offshore

Special cable is used primarily in the offshore and shipping industries. One special characteristic of this cable is that it is protected against fire. EB Norsk Kabel now has several new types of cable on the market. It recently signed contracts for Oseberg and Tommeliten. The largest of these cable types is about 20 cm in diameter. The have built-in safety and efficiency features.

The need for cable of this type will increase when several wells are served by the same platform. "We now have a cable that is 12 km long, but in the future we may produce lengths of 50 km," said administrative director Tore Egil Holte, who stressed that automation in oil recovery would increase profitability.

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ELAB MOBILE PHONE SYSTEM FAVORED BY MOST EUROPEAN COUNTRIES

Oslo AFTENPOSTEN in Norwegian 25 Feb 87 p 14

[Article by Rolf L. Larsen]

[Text] Thirteen of 15 European countries want to base the mobile telephone of the future on a system developed in Norway. If the system is implemented, it could be used in all West European countries. At present, there is a confusing array of mobile telephone systems. The 13 nations want to adopt a so-called narrow-band system as the joint European standard. This would provide better and easier communications over long distances and in difficult terrain.

France and West Germany support a different solution. This could cause a breakdown in cooperation.

"If these two nations do not change their mind before mid-March, they could frustrate plans for a joint European mobile telephone system. This could result in the formation of two or more blocs of countries in West Europe with different systems," chief engineer Petter Bliksrud of the Service Unit for Commercial Radio Services of the Telecommunications Directorate told AFTENPOSTEN.

It was at a meeting of a working group of the European postal and telecommunications organization CEPT on Madeira that the 13 nations expressed their support for the system developed in Norway. This choice is a great credit to telecommunications research in Norway. ELAB of the SINTEF (Foundation for Industrial and Technical Research at the Norwegian Institute of Technology) group in Trondheim and the Research Institute of the Telecommunications Service (TF) in Kjeller are key figures in the development of the system, which required several years of research.

The new mobile telephone will have better sound quality, handle more traffic, and offer a series of data services. In addition, the system will be smaller, lighter, and less expensive than today's mobile telephones. It should be ready for operation by the early 1990's.

West Germany and France support a so-called broad-band system. This would limit communications over long distances and in rugged terrain.

The representatives of the 13 nations were pleased with the technical solutions developed by the Norwegian research institutes for the new mobile telephone system. It was pointed out that Norway has long experience with previous development and use of such systems.

There is an enormous market for a future joint European mobile telephone system and the economic possibilities are great for Norwegian industry.

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